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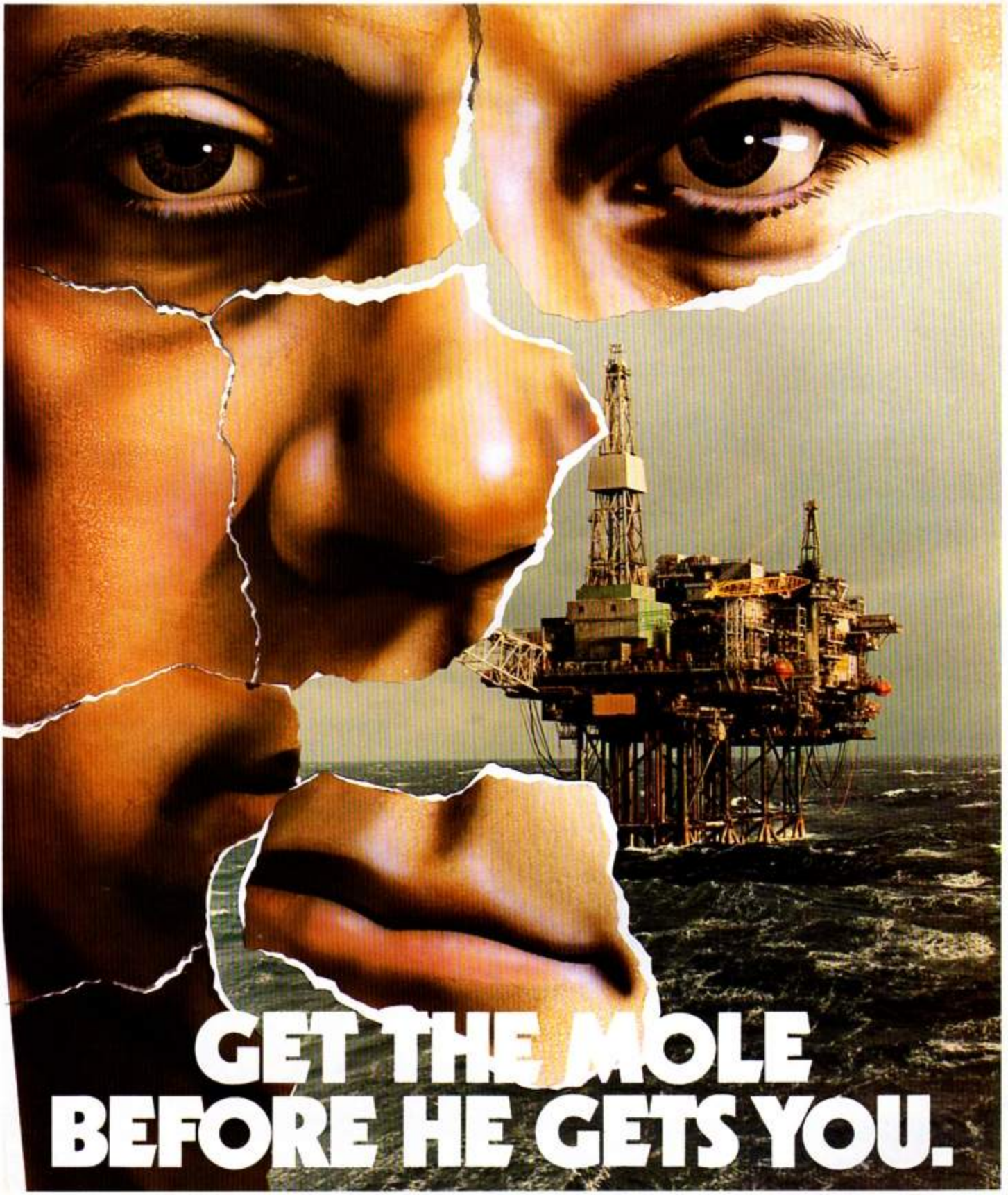

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electron user NEWS

Electron No 3 in top micro list – Acorn

A DRAMATIC claim that the Electron is now number three in the list of best selling home computers has come from Acorn.

The company has also forecast that the machine will enjoy bumper Christmas sales, doubling its market share from 7 to 14 per cent.

In all, Acorn predicts that between 150,000 and 200,000 Electrons will be sold over the festive season.

"This is remarkable in view of the fact we entered the market in a slack sales period and faced a tough battle to establish ourselves", a company spokesman told *Electron User*.

The announcement that the machine is now at number three caused a few eyebrows to be raised within the industry.

However a survey of the High Street retail giants brought mixed reaction to the claim.

"As far as we are concerned it is basically true", said Martin Cresswell of W.H. Smiths. "However one should appreciate that Sinclair products fill the first two positions – and their sales are way out in front of the Electron.

"But of the pack that is following the Spectrum, the Electron is in the lead followed very closely by the Commodore 64".

Over at Currys, merchandise director Richard Ford adopted a "wait and see" attitude when interviewed.

"I'll be able to answer the question as to whether or not the Electron is number three come Boxing Day. But I don't think the company's claim may be too way out.

"But one thing you can say for certain is that Acorn as a company will be the number three supplying company by Christmas".

It was left to David Gilbert, Dixons' marketing manager, to pour cold water on the claim.

"According to our sales the Electron is probably about number five or six at present", he said, "for Sinclair, Amstrad, Commodore 64 and the BBC Micro are all ahead of it.

"But it is being heavily promoted leading up to Christmas, and this may substantially increase the sales figures for the machine.

"It will be interesting to see how the Electron does in fact shape up to some of the other deals being offered on the High Street".

Computer English as she is spoke..

A NEW O-level English course from LCL for the Electron features a talking computer facility.

Micro English consists of 24 programs on disc or cassette that can be used as a self-tuition course or for revision.

A special feature is an accompanying audio cassette, controlled by the Electron and synchronised to 1/100th of a second, enabling the micro to talk to the student.

Adhering closely to the O-level exam the course emphasises the rules of English and their application in practice, with nearly 600 questions.

The program costs £24.50 and consists of either two discs plus audio cassette, or program and audio cassettes.

Record show

THE Electron and BBC Micro User show in December is on target to smash all records.

Advance ticket sales have never been heavier and almost 150 stands are booked inside the 20,000 square feet of London's New Horticultural Hall.

With a host of hardware and software firms competing for attention, prices are likely to be keen.

The show will feature a number of specialist stands to give Electron and BBC Micro fans the most up to date information about their micros.

And there'll be a staggering range of software, books, add-ons, robots, gadgets – and much more.

Also on hand will be a team of experts to brief visitors about the exciting new applications opening up for micro buffs – and to help out with advice on any problems.

Boredom breeds a winner

● *In our picture authors Kristin and Martin Hollis watch Richard test The Magic Sword.*

POPULAR new Electron adventure game The Magic Sword owes its existence to an eight-year-old boy's dislike of text-dominated programs.

Richard Hollis, of Frome, Somerset, was keen to use the computer his family bought last year but found most of the programs rather dull.

So his mother Kristin and brother Martin, aged 12, decided to write a program Richard would enjoy.

That first attempt at program writing was successful and led to games that were eventually published in leading computer magazines, including *Electron User*.

The Magic Sword is the mother-and-son team's most ambitious project to date – an adventure game for five to nine-year-olds that is marketed on cassette by Database Publications at £8.95. The program allows youngsters to explore a fairy tale world peopled by familiar story book characters and sprinkled with magic.

A special bonus is a free 48 page full colour book that recounts all the events leading up to the start of the adventure.

Kristin Hollis wrote the book with help from Martin, who drew the illustrations. Martin devised the game program based on his mother's design and graphics.

Now the pair are hoping to have more games published for Electron users.

After the bomb fell

THE scene is one of total devastation. People are desperately hunting for food and medical supplies while trying to dodge rampaging mutants and the odd flood.

And it's all happening in Accrington.

"In fact, it's what any visitor might see if he visited Accrington on a Saturday evening", says computer programmer Duncan Evans.

"However on this occasion things are perhaps a little bit worse because it has just been under nuclear attack".

The story line is to be found in a new strategy game for the Electron produced by Vampyre Software of Leeds. Written by Duncan Evans, it is called "Red Sky Over Accrington".

Mind you Duncan and his partner Mark Ulyatt readily admit they have never even been to Accrington.

"It's just one of those names that lends itself to things like this", says Mark.

The Electron cassette version of the game is now available at £6.90.

Colour plotter for under £200

DATAFAX, distributor for Sakata Shokai, is bringing out a colour plotter printer this month with A4 paper handling capability for under £200.

The Sakata SCP-800 is the first new product to be launched here since the Japanese firm appointed Datafax.

The Electron-compatible machine also has a 210mm paper roll option and graphics and listings versatility.

Making maths fun

EDUCATIONAL software house Applied Systems Knowledge has launched the first in a projected series of own-label learning programs for the Electron.

Number Painter is a mental arithmetic program for children aged five to 14, aimed at the home education market.

Costing £8.95 it is an arcade style game designed to improve mental arithmetic ability in problems involving addition subtraction, multiplication and division.

Players are challenged to make a given number with a self-imposed time limit using only the numbers shown on the screen.

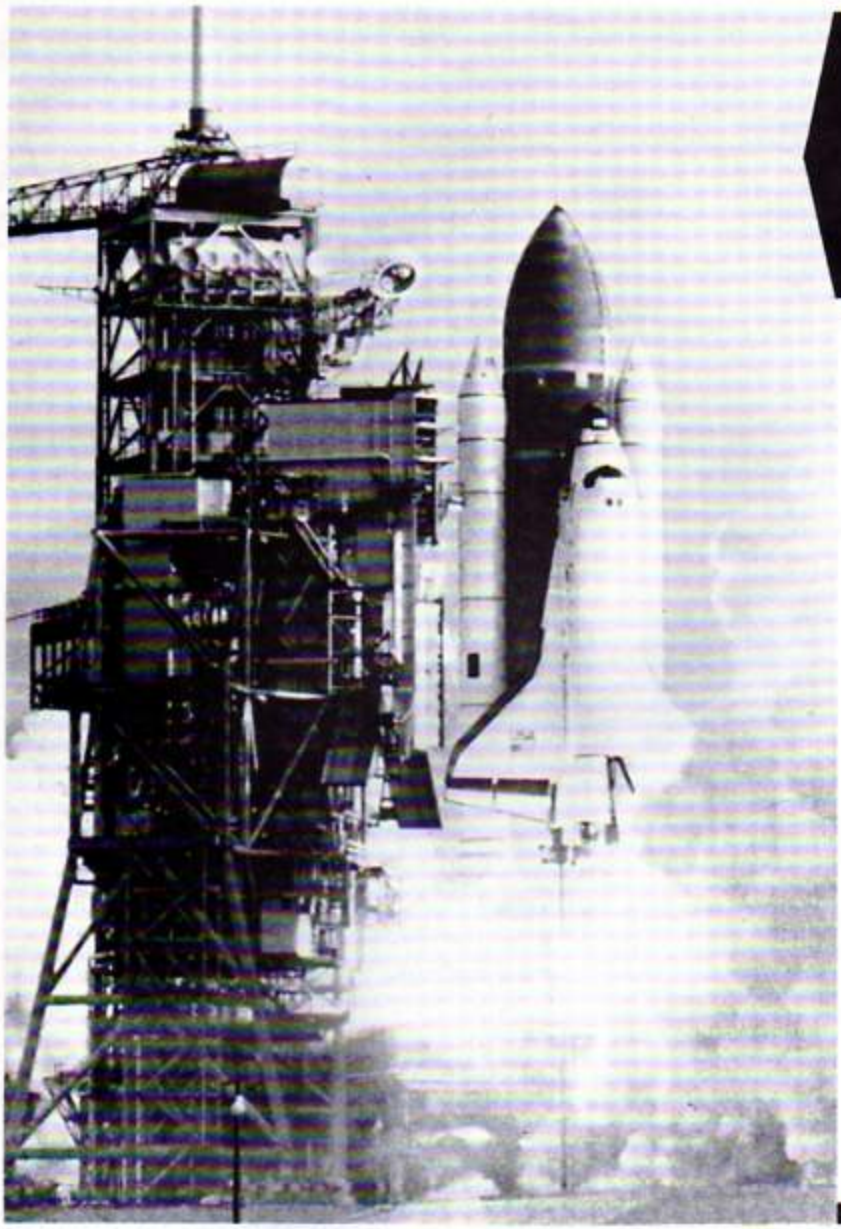
The numbers are collected by Mr Painter who must be manoeuvred up and down ladders and prevented from falling off. Four different speeds cope with different dexterity levels — Mr Plod, Mr Walker, Mr Swift and Mr Speedy.

Enter Plus 3 drive

ACORN was unveiling its Plus 3 self contained disc interface and 3½in single-sided disc drive for the Electron at the Compec show in November.

Also being introduced were word processing package View and spreadsheet program Viewsheet, formerly only available to BBC Micro owners.

An Acorn spokesman said prices for the new products had not been finalised, but View and Viewsheet would cost in the region of £50 each.



Shuttle trip is the prize

SECONDARY school children throughout the country now have the chance to win a five-day trip to America with an opportunity to witness a scheduled shuttle launch from the J.F Kennedy Space Centre in Florida.

The offer is the major prize in the first ever national computer competition for schools – called "The Cub British Schools Computer Challenge" – sponsored by monitor manufacturers, Microvitec.

Apart from viewing the shuttle launch the rest of the five-day itinerary for the winning team of three and their teacher will include a visit to the futuristic Epcot Centre in Orlando.

To get to Cape Canaveral contestants will have to successfully answer a series of computer questions to take them up to the quarter final stage.

From there they will have to shine in a number of computer tasks still to be finalised.

Support for the company's sponsorship has been expressed by local government minister Kenneth Baker.

"A challenge for schools of this kind will undoubtedly help build upon the considerable enthusiasm for the use of computers in education which has developed over the last few years", said Mr Baker.

The competition is open to teams of three contestants with a maximum upper age limit of 16.

Entry forms are to be distributed shortly for the start of the preliminary rounds in November.

Negotiations are at present being held for the televising of the final stages in April or May next year.

Stargazing

MASTERMINDS and stargazers are among the people Mirrorsoft is catering for with its five new programs

Electron users are now being offered Astronomy, developed in conjunction with the London Planetarium, Personality Profile, adapted from the best selling book by psychologist Professor Hans Eysenck, a Weight Control program introduced by Professor Justin Joffe, a Psychic Ability test developed by Hans Eysenck and Carl Serjent and a Mastermind Quiz and Editor based on the BBC series.

Birdwatching

A GAME for Electron users produced in conjunction with the Royal Society for the Protection of Birds has been named Microdealer UK Educational Program of the Year.

Osprey, priced £9.95 from Bourne Educational Software, encourages interest in bird watching and wildlife preservation through a game involving protecting osprey nests from poachers.

● *See review on Page 29.*

Have case, can travel

NOW you can take your Electron anywhere . . . Jenart Design of Bishops Nympton, South Molton, Devon, has launched a carrying case for the machine.

The company, which specialises in computer cases and dust covers, is the brainchild of development engineer Bob Artless.

He set it up shortly after seeing his son struggling off to school with his home computer tucked precariously under his arm.

"I had visions of him dropping it and that would have been £200 down the drain", recalls Bob. "So I designed a case for him and it all started from there".

The Electron case costs £10.99, which includes VAT and postage. It can only be ordered direct from Jenart Design.

Making a million

ELECTRON users can now try their hands at running a software company thanks to Millionaire, just launched by Incentive Software.

Versions are available for the Electron and BBC Micro.

It includes graphics of your house which increases in size as your profits grow.

Players start with £500 to market a program. By careful marketing and maybe the odd dodgy deal with Honest Harry you can move from humble beginnings to a millionaire's estate.

But beware – such a deal could put you on the wrong side of the law.

Part 11 of PETE BIBBY's introduction to programming

Two-dimensional arrays – gateway to the database

LAST month we took a look at one way our Electron can handle lists of numbers and names.

We saw that we could use a line like:

```
10 DIM scores(20)
```

to set up 21 variables all with the same name except for the different numbers in the brackets following it.

These variables were called elements in an array and the numbers in the brackets were called subscripts.

The DIM command in the line above would set up array with variables *scores(0), scores(1), scores(2)* and so on up until *scores(20)*. Each of these variables would initially have the value zero.

We learnt that we could also dimension arrays of string variables, *DIM name$(10)* setting up an eleven element array starting at *name$(0)* and carrying on until *name$(10)*.

Initially these are set to the null string – that is, a string that doesn't contain anything.

Finally we saw how we could combine these arrays and FOR ... NEXT loops to provide some very useful ways of handling lists. Using variables as subscripts we could print out every other name or mark or display a list in reverse order.

Last month's final program, this month's Program I,

```
  10 REM PROGRAM I
  20 REM OLD PROGRAM VIII
  30 DIM name$(3), mark(3)
  40 FOR topofclass=1 TO 3
  50 PRINT "Enter name of
number ";topofclass
  60 INPUT name$(topofclas
s)
  70 PRINT "Enter ";name$(
topofclass);"'s mark."
  80 INPUT mark(topofclass
)
  90 NEXT topofclass
 100 INPUT "Enter number o
f position " position
 110 PRINT name$(position)
;" got ";mark(position);" m
arks."
```

showed how we could set up two arrays in parallel, *name$(3)* and *mark(3)*.

The FOR ... NEXT loop just sets up the array. The real work is done by lines 100 and 110.

Line 100 asks you to give a value to the variable *position*. The next line uses this variable to print out elements *name$(position)* and *mark(position)*.

You'll notice from the above that we only used one number to get two pieces of information.

If we had dimensioned another array, such as *age(3)*, we could have had the program printing out the name, age and mark of the child in whichever position we wanted.

We could have had a fourth or fifth array set up in parallel if we wished, to hold even more information.

These parallel arrays, lists of values and information in an ordered sequence are a very simple form of what is known as a database.

They are a way of collecting information together in an ordered manner that allows us to manipulate – or pick and choose – the items we want, using a key or pointer.

In the very simple database of Program I we used one pointer *position* to give us two pieces of information held in the arrays *name$(position)* and *mark(position)*.

Now let's turn our attention to the situation shown in Figure I. Here we have 16 desks in a classroom. Each desk is numbered and the name of the child sitting at that desk is shown. Also shown is the mark the child got in the spelling test.

From what's already been covered, it should be fairly obvious that we can use arrays to hold this information. Take a look at Program II:

```
  10 REM PROGRAM II
  20 DIM name$(16)
  30 FOR child=1 TO 16
  40 PRINT "Name of child
at desk ";child
  50 INPUT name$(child)
  60 NEXT child
  70 PRINT "You've now set
 up an ordered list ""of n
ames in the array name$()."
```

Here the string variable *name$()*, dimensioned in line 20, is used to hold the name of each child. The array uses the desk number as the pointer.

When you've run the program, if you want to know the name of the child sitting at desk 11, just enter the direct command:

```
PRINT name$(11)
```

and the answer should be REG. Similarly:

```
PRINT name$(15)
```

will give IVY.

Using techniques we learnt last month, we could have the Electron print out the names of each child at each desk in order or reverse order, or even every other child.

We could also use an array to store all the children's marks, as shown in Program III:

```
  10 REM PROGRAM III
  20 DIM mark(16)
  30 FOR child=1 TO 16
  40 PRINT "Mark of child
at desk ";child
  50 INPUT mark(child)
  60 NEXT child
  70 PRINT "You've now set
 up an ordered list ""of m
arks in the array mark()."
```

Here the array *mark()* holds the results of the spelling test. If you want to know the mark Eileen got, just find her desk number and tell the Electron to:

```
PRINT mark(16)
```

and you should get the result 15.

All right, you've run Program II and then Program III and now we have two ordered lists. Let's use them to tell us the name and mark of the child in desk 3.

```
PRINT mark(3)
```

should give you the answer 12 but, alas:

```
PRINT name$(3)
```

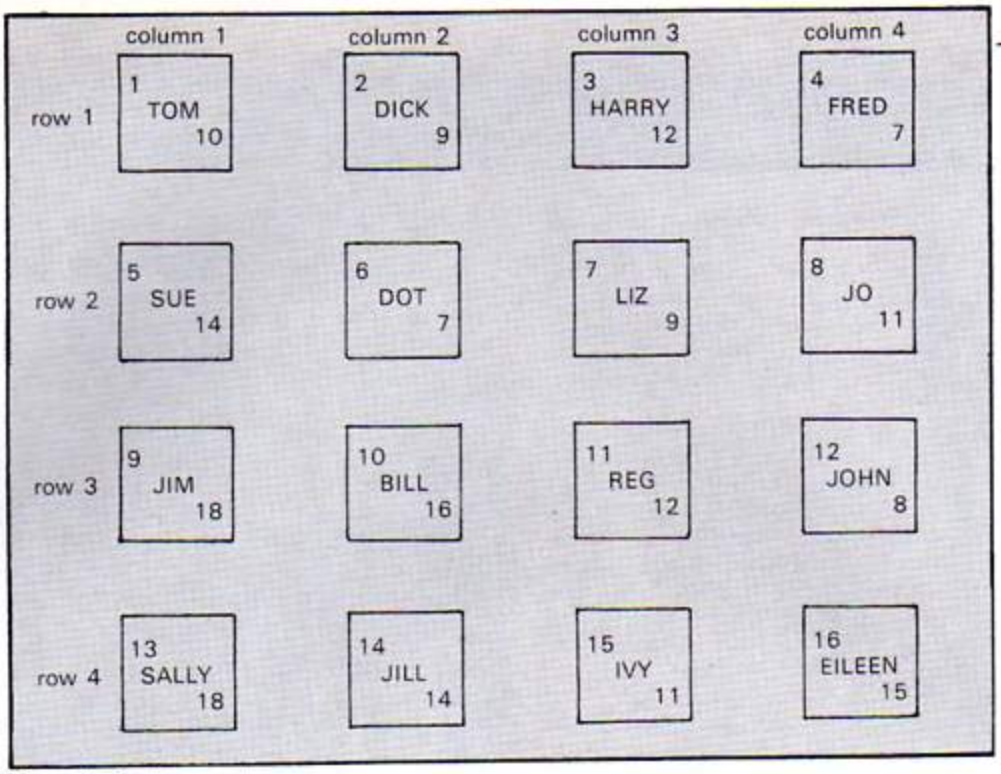


Figure I: Beginners class

just gives you the error message "Array". An error message means that something has gone wrong.

What's happened is that your first array *name$()* was overwritten when you entered and ran Program III. The DIM statement of line 20 told it to set aside some memory space for a list of numeric variables and this it did.

As you hadn't told the Electron that you wanted to keep the string array *name$()*, it simply used that same bit of memory space for the new list. Micros can be very stupid at times.

Never mind. Program IV will allow you to enter all the information in Figure I and it also lets you interrogate the database five times.

```
  10 REM PROGRAM IV
  20 DIM name$(16), mark(1
6)
  30 FOR desk=1 TO 16
  40 PRINT "Enter name of
child at desk ";desk
  50 INPUT name$(desk)
  60 PRINT "Enter ";name$(
desk);"'s mark."
  70 INPUT mark(desk)
  80 NEXT desk
  90 PRINT "You have finis
hed entering data."
 100 FOR loop = 1 TO 5
 110 INPUT "Enter number o
f position " position
 120 PRINT name$(position)
;" got ";mark(position);" m
arks."
 130 NEXT loop
```

All this means is that the second FOR . . . NEXT loop in the program allows you to use the desk number as a pointer to tell you the name and mark of five children. The program is very similar to Program I so making use of the Copy key should save you a lot of typing.

So now we have the information displayed visually in Figure I tucked away inside our micro in the form of two arrays. As you've seen, we can do a lot with such information.

We could add all the marks together and find the average, or we could find the average of the first five desks or the last five.

Try it and see, by varying the last lines of Program IV. And don't drive yourself mad typing in 16 names each time. Change line 30 to:

```
30 FOR desk= 1 TO 4
```

and just deal with the first row while you get the hang of things.

To sum up the above, our use of arrays has structured the data of Figure I in two lists that we can manipulate or use.

But what if we wanted to calculate the average mark of each row and each column of desks in turn? We could do it using the arrays we have now but it wouldn't be easy.

Or again, what if we wanted the names and marks for the kids in the bottom left corner or the top right? Again, we could do it but it wouldn't be straightforward.

Having the arrays ordered one after the other might not be the best way of ordering things.

Wouldn't it be nice if we could store the information in Figure I in such a way that we could refer to each desk not by one number but by the row and the column of the desk? Then we could find out about Eileen by referring to row 4, column 4.

Instead of our lists being in an ordered sequence, they could be in a sort of grid, mimicking the classroom itself.

As you might guess, there is a way of doing this and it involves our old friend the DIM statement.

We use it to dimension what is known as a two-dimensional array, an array which has two subscripts. Don't worry if you don't follow this, read on and all will be explained.

Let's create a two-dimensional array. We do this with a line like:

```
20 DIM desk(4,4)
```

in a program.

You'll notice that it's very much like the previous DIMs we've dealt with but that there are now two numbers in the brackets, separated by commas. These two numbers are what make it a two-dimensional array.

What happens when the Electron executes line 20 is that it sets up 25 variables. All are shown in Figure II.

As you can see, the variables range from *desk(0,0)* and *desk(0,1)* all the way to *desk(4,3)* and *desk(4,4)*. The DIM statement has, as before, set up a series of variables with the same name stem but with varying subscripts.

The difference is that in a two-dimensional array we have two subscripts in the brackets of an array element.

If you look at Figure II you'll see that we've set up 25 variables and a closer look will

→

desk(0,0)	desk(1,0)	desk(2,0)	desk(3,0)	desk(4,0)
desk(0,1)	desk(1,1)	desk(2,1)	desk(3,1)	desk(4,1)
desk(0,2)	desk(1,2)	desk(2,2)	desk(3,2)	desk(4,2)
desk(0,3)	desk(1,3)	desk(2,3)	desk(3,3)	desk(4,3)
desk(0,4)	desk(1,4)	desk(2,4)	desk(3,4)	desk(4,4)

Figure II: A two-dimensional array

From Page 9

show that each variable has its own unique pair of subscripts.

You might also notice that the variables seem to fall naturally into ordered series.

One example is:

```
desk(2,0)
desk(2,1)
desk(2,2)
desk(2,3)
desk(2,4)
```

Looking at Figure II, they all seem to fall into one column. Notice that the first subscript in each variable, 2, stays the same, while the second subscript goes from 0 to 4.

Anyone who thinks of nested FOR ... NEXT loops here goes to the top of the class.

Again, looking at Figure II you might pick out a row formed by the variables:

```
desk(0,3)
desk(1,3)
desk(2,3)
desk(3,3)
desk(4,3)
```

By now you might be seeing why it's called a two-dimensional array. If you were so inclined, you could name any of the elements of the array as *desk(x,y)* where *x* and *y* are variables.

When *x* is 2 and *y* is three, then the element we are naming is *desk(2,3)*.

Of course, if we called the subscript variables *column* and *row*, any element of the array could be reffered to as *desk(column,row)*. Or, equally as well, *desk(row,column)*.

Taking the latter case, if, in the course of a program, *row* is 4 and *column* is 2, then the element *desk(row,column)* is *desk(4,2)*.

Looking at Figure II again, you'll see that if you ignore all the elements that have a zero in them – effectively, the first row and column – what's left is very much like a map of the classroom in Figure I.

In fact we can use our two-dimensional array to hold the desk numbers, the array mimicking the classroom.

Of course, we've done this before in the one-dimensional arrays we learnt about at first.

The difference is that this time we can get at the information row by row, or column by column or, even any combination of the two.

Program V shows this in action.

Line 20 dimensions a two-dimensional array while the nested FOR ... NEXT loops work their way around the class. If you can't follow that, work it out on a piece of paper.

While *column* is 1, *row* goes from 1 to 4 with the inputs being stored in the variables *desk(1,1)*, to *desk(4,1)*.

Once the program has built up the array it enters another series of FOR ... NEXT loops. These print out the values of *desk(row,column)*, but they do it selectively.

The variable *row* only has values 1 and 3 – look at the STEP – while *column* cycles from 1 to 4 for each of these two values.

The result is that only the desk numbers for the boys are printed out. Can you alter the program so that it prints out the girl's desk numbers?

As you can see from the above, we've used an array with two subscripts to hold information. The fact that it has two subscripts means that we can do more things with it than with an ordinary array.

We can use FOR ... NEXT loops to deal with whole rows or columns at a time.

```
  10 REM PROGRAM V
  20 DIM desk(4,4)
  30 FOR column=1 TO 4
  40 FOR row=1 TO 4
  50 PRINT "Enter the numb
er of the desk in row ";row
;" , column ";column
  60 INPUT desk(row,column
)
  70 NEXT row
  80 NEXT column
  90 CLS
 100 PRINT
 110 PRINT "The boy's desk
s are numbered:"
 120 FOR row=1 TO 3 STEP2
 130 FOR column=1 TO 4
 140 PRINT desk(row,column
)
 150 NEXT column
 160 NEXT row
```

Notice that while the elements of a two-dimensional array have two subscripts, that element only takes one value. In Program V *desk(1,1)* held only the value corresponding to desk number one.

The second subscript doesn't let us hold any more information, it just allows us to deal with it better.

You could use three two-dimensional arrays to hold the whole of the information in Figure I.

Program VI does this, setting up three two-dimensional arrays in line 20. Then come the familiar nested loops to enter all the information into the arrays.

This is much the same as the previous program, except that we're also using a string array. The interesting point comes after line 150 where we use our faithful nested loops to pick out and print the details of the middle four desks.

```
  10 REM PROGRAM VI
  20 DIM name$(4,4),mark(4
,4),desk(4,4)
  30 FOR row=1 TO 4
  40 FOR column=1 TO 4
  50 PRINT "Enter the name
 of the child in the desk i
n row ";row;" , column ";co
lumn
  60 INPUT name$(row,colum
n)
  70 PRINT "Enter "name$(r
ow,column)" 's mark"
  80 INPUT mark(row,column
)
  90 PRINT "Enter "name$(r
ow,column)" 's desk number"
 100 INPUT desk(row,column
)
 110 NEXT column
 120 NEXT row
 130 FOR delay=1 TO 200
 140 CLS
 150 PRINT
 160 PRINT "THE RESULTS FR
OM THE MIDDLE FOUR DESKS:"
 170 FOR row=2 TO 3
 180 FOR column=2 TO 3
 190 PRINT name$(row,colum
n)" in desk number ";desk(r
ow,column);" scored ";mark(
row,column)
 200 NEXT column
 210 NEXT row
```

If you can't follow how that's done, just make up versions of Figure II using *mark()* and *name$()* and you'll see why the loops have the values they do.

Finally run Program VII. It sets up the database as before, storing the classroom information in two two-dimensional arrays.

It then asks you to enter a row and column number and gives you the information on the child who sits at that desk.

```
  10 REM PROGRAM VII
  20 DIM name$(4,4),mark(4
,4)
  30 FOR column=1 TO 4
  40 FOR row=1 TO 4
  50 READ name$(row,column
),mark(row,column)
  60 NEXT row
  70 NEXT column
  80CLS
  90 PRINT
 100 INPUT "Give me a row
number " row
 110 INPUT "Give me a colu
mn number " column
 120 PRINT name$(row,colum
n)" scored ";mark(row,colum
n);" marks"
 130 DATA TOM,10,SUE,14,JI
M,18,SALLY,16
 140 DATA DICK,9,DOT,7,BIL
L,16,JILL,14
 150 DATA HARRY,12,LIZ,9,R
EG,12,IVY,11
 160 DATA FRED,7,JO,11,JOH
N,8,EILEEN,15
```

As you can see, setting up the database allows you to ask all sorts of questions about the class. But then you've probably got all sorts of questions about Program VII itself.

What's all this DATA and READ?

Well, the answer to that comes next month. For the time being, just look on them as ways to avoid typing in all those names and marks.

Meanwhile, just play around with a few two-dimensional arrays, giving them values and seeing what you can do with them. You'll find them very handy.

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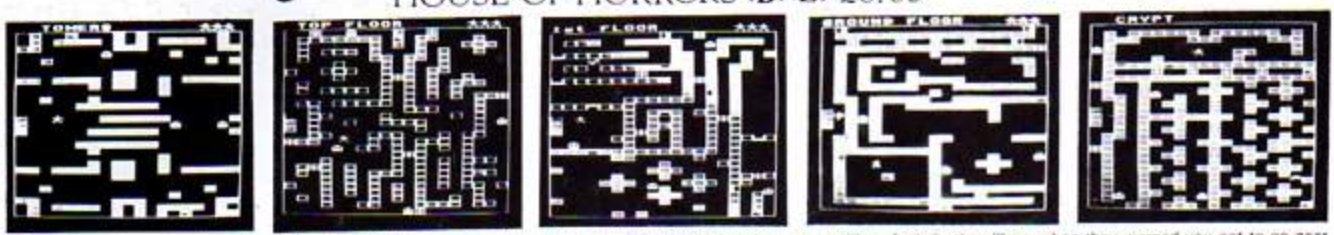

Turn off the lights and gather around for the most creepy game of the year. How you laughed at those superstitious fools in the village when they warned you not to go near the old house. The climb up the rocky path under the afternoon sun was swift and within an hour you had passed through the outer gates of this once great house. The dust and cobwebs hadn't bothered you as you climbed the old stairs to the towers on the top level. Did you notice how low the sun had fallen before the sounds of locks clicking reached your startled ears? How can the moon be out already and what's that moving towards you??? This all action game will have you ducking and diving from the GHOSTS and ZOMBIES, and matching wits with a MUMMY, WEREWOLF, and VAMPIRE. 5 floors full of odd CORRIDORS, BROKEN FLOORBOARDS, and riddled with SECRET PASSAGES await you. Superb sound effects and graphics. Can be played using either keyboard or joysticks. Top table. Pause option.

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A) MICKEY THE MONKEY and his apple tree make subtraction fun.
B) COLOUR BLOCKS bring sizes and colour into perspective.
C) MERRY MUSIC turns the keyboard into a musical keyboard.
D) FUNNY FACES presents a line up, which one is the suspect?
E) FRED THE FROG needs co-ordinated help to get across the pond.

EARLY YEARS 2
A) THE POND seems very active today.
B) SPEED is required to keep the cake on the conveyor belt.
C) DIRECTIONS seem to be needed by everyone in Orion village.
D) ORDER the blocks.
E) SID THE SPIDER needs some help to get out of the maze.

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QUAL-SOFT Comments: About our previous advert Mr J. Carter of Barnsley 'phoned'. *Don't tell us what people think of LEAGUE DIVISION ONE for the BBC B, what do they say about SOCCER SUPREMO for the ELECTRON?*" Copy dates being what they are, we hadn't sold any ELECTRON games when we wrote last months advert, but now, at the time of writing we've been delivering the program for four weeks (probably eight to twelve as you read this), and, to escape accusations of selective quotes, we will give you the first paragraph of the first letter we had received about SOCCER SUPREMO, from J. Hooley of Twickenham: "*Many thanks for the fantastic game. As soon as I received it, there was no stopping until the end of the season*". **We make that about six hours continuous play!** And in the first telephone conversation P. Wright of Swansea began: "*This is by far the best game I've found for the ELECTRON*". OK Mr Carter?

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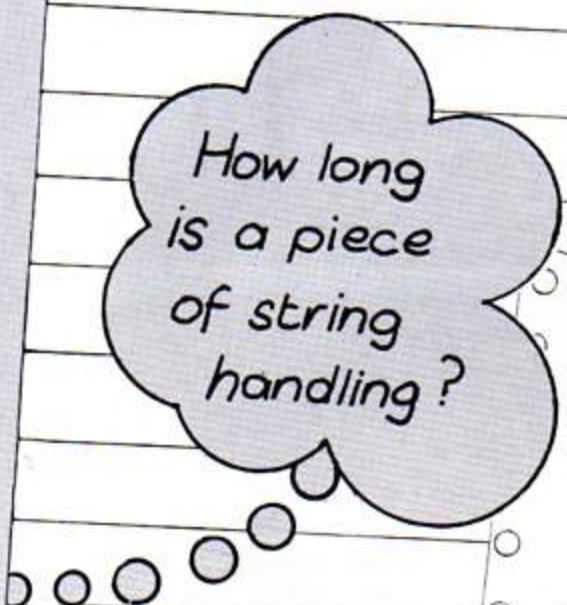
Notebook

THIS month's Notebook uses string handling techniques to show how the MOD function produces a series of remainders that cycle in value.

If MOD and DIV baffle you take a look at Dave Robinson's article in the September *Electron User*. Or just sit back and watch the number patterns.




```
27 MOD 5
3
4
0
1
2

PRESS SPACE
```

```
10 REM REMAINDER
20 REM TOM PRATT
30 MODE 6
40 VDU 19,1,3,0,0,0
50 VDU 23,1,0;0;0;0;
60 FOR divisor=1 TO 5
70 string$=STRING$(divis
or," ")
80 FOR dividend=1 TO 50
90 addtostring$=STR$(div
idend MOD divisor)
100 string$=RIGHT$((strin
g$+addtostring$),divisor)
110 PRINT TAB(10,8);divid
end;" MOD ";divisor
120 FOR stripstring=1 TO
divisor+1
130 PRINTTAB(10,8+2*strip
string)MID$(string$,stripst
ring,1)
140 NEXT stripstring
150 FOR delay= 1 TO 200:N
EXT delay
160 NEXT dividend
170 PRINT TAB(10,23)"PRES
S SPACE":wait=GET
180 PRINT TAB(10,8)STRING
$(8," ")
190 NEXT divisor
```

yellow text

sets up a string of spaces

Outer loop — Cycles 5 times changing dividend

Inner loop

Middle loop cycles 50 times changing dividend

holds things up

erases heading

10-30	Surely you don't need these explaining to you!
40	This changes the text colour to yellow, palette colour 3.
50	See 10.
60, 190	Form a FOR . . . NEXT loop with control variable *divisor*. The divisor is the number that comes after the MOD. As the loop cycles this goes from 1 to 5.
70	Sets up a string variable *string$* and fills it (for the time being) with spaces. This will later hold a series of results from a MOD with the same divisor but different dividends. The number of spaces is determined by divisor.
80,160	Make up a FOR . . . NEXT loop which has the control variable *dividend* changing from 1 to 50.
90	This uses the function STR$ to turn the result of *dividend* MOD *divisor* into a string. This is placed in the variable *addtostring$*.
100	Isn't as complicated as it looks. First it joins *addtostring$* and *string$*. It then uses RIGHT$ to take the first *divisor* letters of this new string and give it to *string$*.
110	Just prints the top line. This varies with *dividend* and *divisor*.
120, 140	Form yet another FOR . . . NEXT loop, this time with control variable *stripstring*.
130	This splits *string$* into its separate components and prints them underneath each other.
150	A delay loop. Leave it out and see what happens.
170	Holds things up until a key is pressed.
180	Overprints the top line with spaces. Again, leave it out and see what happens.

Trevor Roberts

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EU/12

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Alternatively, however, you could always take a chance and drop a line to Father Christmas.

ACORNSOFT
Software for the BBC Micro and Electron.

9.00 Firebug

A fast moving arcade-type game in which you are a fireman, trying to rescue some oil drums and take them to the safety of a water tank. Your opponent is the firebug who runs around lighting fires which move slowly towards the drums and fire extinguishers, destroying them if contact is made.

10.00 Maze

A gripping graphics game where you enter a top secret installation with the aim of stealing secrets from a rival company. The security system, however, has many levels each consisting of a maze of corridors patrolled by armed robot guards. Complete with full colour 3-D graphics, sound effects and a high score table.

12.00 Elite

A superb 3-dimensional graphics game that's light years ahead of any other. You are a space trader who roams the universe, making your living from buying and selling cargo in your Cobra space craft. On your travels, you will encounter aggressors who are eager to put an end to your dealings. Be warned, only the fittest will survive.

1.00 Crazy Tracer

A crazy adventure in which you guide a paint roller round the edge of a maze of rectangles, while avoiding the monsters which are trying to stop you by crushing the roller. Beware – as the game progresses, so the number of monsters chasing you will increase.

3.00 Go

'Go' is a board game for two players which originated in China 3000 years ago and is now more popular than Chess in the Far East. It requires strategic insight, intuition and a strong, calculating mind. If you wish, you can also challenge the computer at differing degrees of difficulty. A velly good game indeed.

4.00 Watch Your Weight

At last, a weight-loss program designed especially for you. With it, your computer becomes an expert wholly conversant with and sympathetic to your needs, and will help you choose an appropriate and individual weight-loss plan. The program also includes a calorie counter and a series of apposite menu suggestions to help stimulate your imagination when you just can't think what to eat.

5.00 The Complete Cocktail Maker

With everything from a Black Russian to a Betsy Ross, this program contains data sufficient to concoct a staggering 320 different cocktails.

6.00 Paul Daniels' Magic Show

Stun and amaze your friends with your astounding feats of magic. This program contains ten tricks to be performed by or with your BBC Micro/Electron. Hurry though – it's bound to disappear fast.

CHRISTMAS !SNAP!

CHRISTMAS Snap is Phil Tayler's Electron version of the old card game for young children.

A multicoloured Christmas object, such as a tree, appears on the left of the screen and a series of similar objects appear one after the other on the right.

Your job is to tell the Electron when the colours of the objects match exactly. Only you don't say "Snap" – you press the space bar.

If you're wrong you'll get a short beep. If you're right . . . well play the game and find out.

Happy Christmas. Happy Christmas. Snap!

Full listing starts on Page 55

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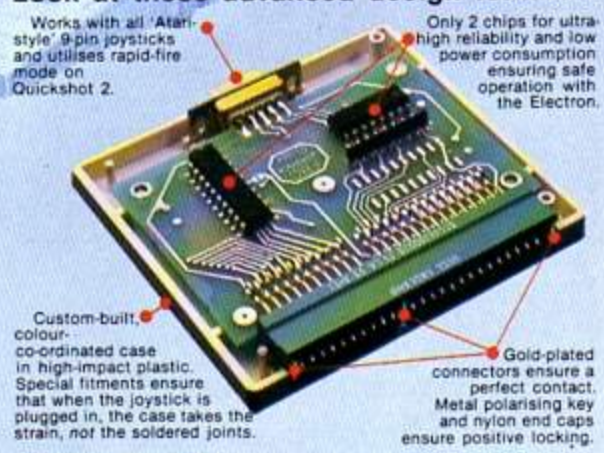
Look at these advanced design features.



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Let your programs add their own data statements

This easy-to-follow utility by JOHN WOOLLARD is a helpful aid to school programming

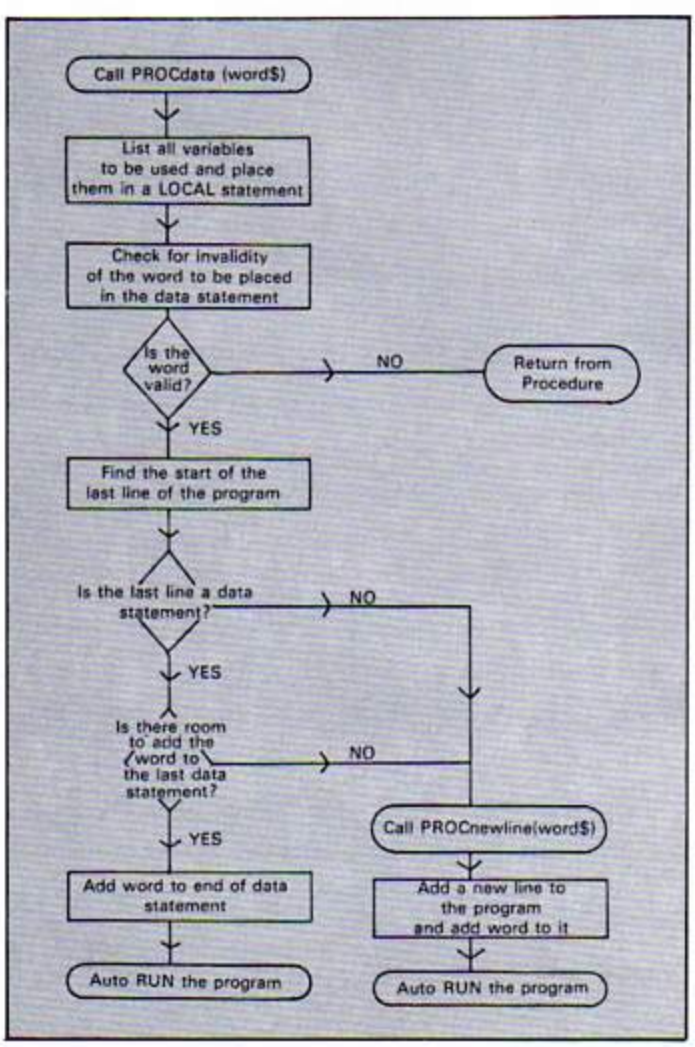

Figure I: Flow diagram

MANY of the programs I use in my school have a series of data statements in them, containing information like word lists, vocabulary, names and questions and answers.

Frequently these need to be extended. However the users – both teachers and pupils – may not be able to stop a program and add their own data statements. So it was necessary to develop a way whereby a program could add data statements to itself.

Autodata contains two procedures which can be used to do this.

If you want a copy of Autodata and don't feel up to typing it in yourself then send off for this month's *Electron User* tape (see Page 44).

But if you wish to see how your Electron remembers programs and organises its memory then switch on and we'll begin.

Enter line 70 – making sure that the character after OLD, RENUMBER, *FX210,1 and LIST is a "¦"

```
70 *KEY10OLD¦MRENUMBER¦M
¦N*FX210,1¦MLIST¦M
```

Now run it and press Break.

If your screen displays:

```
Acorn Electron
BASIC
>
```

and nothing else, then go to the beginning and start again (or go to the bottom of the class and learn to read).

Line 70 programs the Break key. It tells the computer what to do after someone has pressed Break.

OLD causes the computer to re-remember the program in memory.

RENUMBER renumbers the program from line 10 in steps of 10 (the default values). After pressing Break check that the computer has not "failed" to renumber.

If a "failed at" message appears then that line has a GOTO, GOSUB, ON GOTO or ON GOSUB instruction which needs changing. Of course, none of my friends uses GOTOs or GOSUBs so it does not apply to them!

I find the renumber instruction useful when developing programs. If I need to insert a lot of extra lines then pressing Break makes room for more.

*FX210,1 is for the benefit of your family! As I do most of my programming in bed and in the early hours the place is rather quiet. It does not matter how careful I am – I'm bound to accidently press the Copy key causing an offensive beep. So *FX210,1 (which cuts off all sound output) is my salvation.

By the way, it also stops the sound output of most arcade type games so even those don't cause grievous annoyance to the rest of the world.

Ctrl + N sets the page mode on (see VDU14). This means the automatic scrolling of the screen is stopped and the computer waits until Shift is pressed, which reveals another page of printing. Pressing Escape enables the user to edit the program.

After Break has been pressed and the instructions given so far are completed the computer lists the program one screenful at a time.

When the development of a program is finished I usually change the line to:

```
70 *KEY10OLD¦MRUN¦M
```

If Break is pressed, either accidently or on purpose, the program reruns itself from the beginning. Pressing Ctrl + Break then typing OLD+ Return allows a programmer access to the program.

Back to the problem in hand – the development of a routine that will allow the program to add data statements to itself.

The first step is to draw a flow diagram which shows the algorithm of the proposed program. That should contain all the facilities required in the final program and the precise order of action. See Figure I.

All the action will be contained in a procedure called PROCdata( ).

However to keep the structure of that procedure simple it was necessary to call from within PROCdata( ) another procedure called PROCnewline( ).

Now the algorithm of the program has been set out it is necessary to convert this into statements in Basic.

Line 210 lists all the

variables used in the procedure. This is most important if it is going to be used in a variety of programs.

We do not want to use the variable *last%* and change its value if it is used in another part of the program.

By placing it in a LOCAL statement even if *last%* is used in the rest of the program this procedure will not change its value.

Lines 220 to 280 check for invalidity in the word to be added to the data statements. It is important that the word does not contain quotation marks.

If they were inserted in a data statement an error would occur when the statement is read. All quote marks are removed and replaced by apostrophes.

If the word is a null string then the process aborts. If the word is longer than 247 characters then it must abort because it is not possible to have a data statement of that length.

Finally, in this checking section there is a check for embedded commas.

If a comma exists in the word it is necessary to surround the word with quotes before placing it in the data statement. Line 280 does that.

Before we can understand the workings of the rest of the procedure it is necessary to look at the way the computer remembers a Basic program in memory. The Electron User Guide (Pages 127 to 129) gives an outline of this.

A Basic program is stored starting at the value of the variable PAGE and extending through to the value of the variable TOP. Type PRINT~PAGE and press Return and you will get the result E00.

Type PRINT ~TOP, then press Return. If you have no program in memory the value printed will be E02.

The difference between the two values indicates the size of the program. The longer the program the higher the value of TOP. Type in another line and see.

Type in lines 80, 490 and 500 of the main program. Line 80 sets the function key so that if it is pressed PROCquery is called.

PROCquery is contained in lines 490 and 500 and displays the contents of each location of memory from PAGE (the start of the Basic program) to TOP (the end of the Basic program).

By pressing function key 1

Memory location		Value
PAGE	(E00)	13
PAGE+1	(E01)	Low byte of the first line number.
PAGE+2	(E02)	High byte of the first line number.
PAGE+3	(E03)	Length of the first line
	(E04)	⌐
		|
		| Characters of the first line.
		|
		⌙
		13
		Low byte of the second line number.
		High byte of the second line number.
		Length of the second line.
		⌐
		| Characters of the second line.
		⌙
		13
		.
		. and so on.
		.
		Low byte of the last line number.
		High byte of the last line number.
		Length of the last line.
		⌐
		| Characters of the last line.
		⌙
TOP-2		13
TOP-1		255
TOP		

Figure II: Memory map showing the structure of a Basic program

```
  10REM AUTODATA
  20REM
  30REM (C) Electron User
  40REM
  50REM W.John Woollard
  60REM
  70*KEY10OLD|M|N*FX210,1|
MREN.|ML.|M
  80*KEY1PROCquery|M
  90MODE6
 100PRINT''"AUTODATA"
 110PRINT''"To add a word
to the DATA statements   t
ype the word then Return."
 120PRINT''"Press ESCAPE t
o stop the program, then  t
ype LIST and press Return t
o see the   new statements.
"''
 130INPUTword$
 140PROCdata(word$)
 150STOP
 160REM end of control mod
ule
 170REM
 180DEFPROCdata(data$)
 190*KEY6|LRUN|M
 200PRINT''''"Press FUNC 6
now !";:REPEAT:UNTILGET=12
 210LOCALtop%,last%,count%
,len%,v%
 220IFLEN(data$)=0THENENDP
ROC
 230IFLEN(data$)>247THENEN
DPROC
 240IFHIMEM<TOP+&100THENEN
DPROC
 250REPEAT:v%=INSTR(data$,
CHR$34)
 260IFv%>0THENdata$=LEFT$(
data$,v%-1)+"'"+RIGHT$(data
$,LEN(data$)-v%)
 270UNTILv%=0
 280IFINSTR(data$,CHR$44)>
0THENdata$=CHR$34+data$+CHR
$34
 290len%=LEN(data$)
 300top%=TOP:last%=TOP-2
 310REPEAT:last%=last%-1:U
NTIL?last%=13AND?(last%+?(l
ast%+3))=13
 320IF?(last%+4)<>220THENP
ROCnewline(data$)
 330IFLEN(data$)+(TOP-last
%)>230THENPROCnewline(data$
)
 340?(top%-2)=44
 350FORcount%=1TOlen%:?(to
p%-2+count%)=ASC(MID$(data$
,count%)):NEXT
 360?(top%-1+len%)=13:?(to
p%+len%)=255:?(last%+3)=?(l
ast%+3)+1+len%
 370END
 380DEFPROCnewline(data$)
 390hi%=?(last%+1):lo%=?(l
ast%+2)
 400IFlo%+10>255THENhi%=hi
%+1
 410lo%=(lo%+10)MOD255
 420?(top%-1)=hi%:?(top%)=
lo%
 430?(top%+1)=len%+5
 440?(top%+2)=220
 450FORcount%=1TOlen%:?(to
p%+2+count%)=ASC(MID$(data$
,count%)):NEXT
 460?(top%+3+len%)=13
 470?(top%+4+len%)=255
 480END
 490DEFPROCquery:VDU14:FOR
K=PAGE TO TOP:X=?K:PRINT;K,
X;:IFX>32ANDX<127THENVDUX,1
3,10ELSEVDU13,10
 500NEXT:ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 47.

From Page 19

the memory can be displayed. Try adding a line to the end of the program to see the change to the output of the procedure.

If you analyse the result you may be able to see the pattern in Figure II.

To allow us to peek inside the memory of the computer (and to change the content of the memory) there are indirection operators. Pages 129 and 130 of the Electron User Guide describe their use.

We will be concerned with the use of "query" – the byte indirection operator.

To peek at the contents of a location, say &E00, type PRINT ?&E00 and press Return. The number printed will be between 0 and 255 inclusive.

To change the value at a particular location, say &E00 type ?&E00=32. The value 32 is placed in location &E00.

Warning! Typing ?&E00=32 will cause the computer to state bad Program if an attempt to LIST, RUN or SAVE it is made.

Lines 300 and 310 search the memory of the computer starting at just below TOP and working downwards until the next end of line character is met.

Line 310 not only checks it is an end of line character (13) but that it occurs immediately before the start of the next line.

If the ?(last%+?last%+3)) is equal to 13 then the 13 encountered is actually a character in the middle of the final line of the program.

The value *last%* generated at this point is equal to the end of the penultimate line of the program.

Line 320 checks to see if the last line is a data line. The key word for a data line is represented by CHR$44.

If the last line is not a data statement then PROCnewline( ) is called to add a new line to the program.

If the last line is a data statement then line 330 checks that there is enough room to add the word to the end of it. If there is not then PROCnewline( ) is also called.

It must be noted that both PROCdata( ) and PROCnewline( ) do not end with ENDPROC but with END.

This is necessary because after we have artificially extended the last line or added a new line the computer needs to go through the action of OLD, RUN or SAVE before attempting any processing. That is the reason for lines 190 and 200 of the procedure PROCdata( ).

Line 190 sets up the function key 6 so that when it is pressed it generates CHR$12 then RUN then CHR$13 (for example Return).

Line 200 puts up the prompt "Press FUNC6 now!" and waits until CHR$12 is generated from the keyboard.

There is no significance in the number 12 other than that it is not possible to enter that value by accidently pressing any one key.

By pressing function key 6 not only is CHR$12 generated but the keyboard buffer is also loaded with RUN+Return. So, when the program is ENDed and the cursor appears, the program starts again. On the flow diagram this is referred to as "auto RUN".

Lines 340 to 360 and lines 390 to 470 poke the data statements into the correct memory locations.

Lines 390 to 410 calculate the value of the next line number for the new data statement. It is 10 above the last line number.

These two procedures can now be incorporated into any Basic program which requires the addition of new data statements. Simply typing PROCdata("Electron User")+Return will add that phrase to the last line, if it is a data statement, or add a new line to the program with that phrase as data.

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Part III of NIGEL PETERS' series on making the most of the Electron's sound channels

Sound advice on how to jump the queue

LAST time we talked about using the SOUND command to write music and I left you with a simple tune-writing program.

By now you should be able to understand what the sound commands are doing when you run Program I. Lines 20, 40 and 60 just use SOUND to play three notes, one after the other. Lines 30, 50 and 70 put the messages on the screen. Nothing difficult there. Try running it again and see if you notice anything odd about the messages. They seem out of step with the notes, don't they?

We know the Electron executes the program lines one after the other in numerical order. Looking at the listing would lead us to suspect that line 20 would make a noise, then the message "Sound 1" would appear on the screen, fulfilling line 30.

```
10 REM PROGRAM I
20 SOUND 1,-15,52,10
30 PRINT "Sound 1"
40 SOUND 1,-15,56,10
50 PRINT "Sound 2"
60 SOUND 1,-15,60,10
70 PRINT "Sound 3"
```

Next the Electron would play the note ordered in line 40 and then go on to print the message of line 50, "Sound 2".

Finally line 60's SOUND command would be obeyed and the message "Sound 3" would come up on the screen.

That's what we might expect – but it's not what happens. All the messages appear on the screen while the first note is playing. They stay there stubbornly while the second and third notes are sounded.

Run Program I again and you'll see what I mean. Some parts of the program are being obeyed before others.

It looks like the Electron has executed lines 20 and 30, then lines 50 and 70 before going back to process 40 and 60.

What's happened is the result of the way the Electron's Operating System (OS) is designed. As you know, Electron Basic is very, very fast. It can whip through a simple Basic program like a dose of salts.

However when you come to the SOUND command we're operating on a different time scale. We don't want the sound over and done with in a fraction of a second. We'd never hear it!

We want the note to last for however long we've set the *duration* parameter.

The problem now arises, do we hold up the program while the note plays? If we've set *duration* to 40, do we really want our masterpiece to grind to a halt for two seconds while the Electron makes a noise?

What would you feel about a games program that stopped for a few seconds every time it made a sound?

One way round this would be for the Electron to pass every SOUND command it came across over to a special part of the micro that dealt only with producing noises. Then it could get on with the program while the sound generator made the sound.

If, as it was working its way through the program, it came across another SOUND command it would pass the handling of this to the sound generator and carry on.

This is what happened in Program I. The Electron got to line 20 and delegated producing the noise to the sound generator. It was then free to get on with line 30.

Coming to line 40 it found another SOUND command which it immediately passed to the sound generator and went on to line 50, printing the required message.

Line 60 was passed over to the sound producing part of the micro and line 70 was obeyed, displaying the final message.

As each sound has to last for its full *duration* – in this case one second – the messages are printed before the sounds get a chance to finish playing.

It doesn't take your Electron

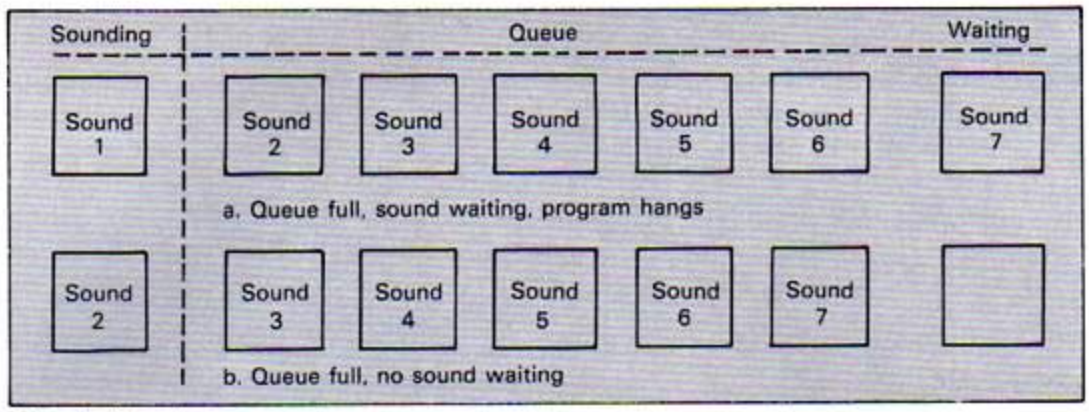

Figure I: How the queue works

three seconds just to print three messages on the screen. The program finishes, but the sounds keep on sounding long after.

You can picture the sounds as being put in a queue. The first note is played for as long as its *duration* parameter specifies, then the next note in the queue, and then the one after that.

Meanwhile the program itself carries on regardless, shoving any SOUND commands it gets onto the sound generator's queue.

It's almost as if the Electron said to itself: "Ah, here's another SOUND command. I don't want to have to wait for it to play its full length so I'll put it in the queue and get on with the next line of the program".

With this system of queueing sound commands in mind, have a look at Program II.

```
10 REM PROGRAM II
20 SOUND 1,-15,52,20
30 PRINT "Sound 1"
40 SOUND 1,-15,56,20
50 PRINT "Sound 2"
60 SOUND 1,-15,60,20
70 PRINT "Sound 3"
80 SOUND 1,-15,64,20
90 PRINT "Sound 4"
100 SOUND  1,-15,68,20
110 PRINT "Sound 5"
120 SOUND  1,-15,72,20
130 PRINT "Sound 6"
140 SOUND  1,-15,76,20
150 PRINT "Sound 7"
```

Did you notice the slight hesitation between Sound 6 and Sound 7 appearing on screen?

From what we've learnt about the sound queue, we might have expected all seven messages to appear while the sounds take their turn in the queue. But this isn't what happens.

The program merrily displays the first six messages while the first sound is playing. The last message has to wait for the first note to finish playing before it appears – hence the hesitation.

The explanation lies in the fact that the sound queue only has a limited number of places. In fact it only has places to store five notes, apart from the one that's playing.

When it is asked to store yet another, it accepts it but at a price. The price is that the program halts until the first note has stopped playing and the stored sounds can shuffle up the queue. Figure I shows this diagramatically.

This is what's happened in Program II. The first SOUND command is obeyed and the message printed. The sounds produced by lines 40, 60, 80, 100 and 120 are put in the queue while the messages of lines 50 to 130 are displayed.

When it comes to the SOUND command of line 140 the Electron tries to put it in the sound queue but finds it full. The result is that the program is halted until that SOUND command can be processed.

When the first note has finished playing, the second note starts to be played while the other notes move up one place in the queue.

This leaves room for the SOUND command of line 140 to join the queue. When this happens the queue is no longer full and the program carries on and displays the final message.

Program III uses a FOR . . . NEXT loop with loop control variable *noise* to produce 50 sounds one after the other. Each sound is a semitone higher than the previous one.

Line 40 sees to this by making the pitch parameter of the SOUND command equal to *noise* multiplied by four.

```
10 REM PROGRAM III
20 FOR noise=1 TO 50
30 PRINT "Noise number:
";noise
40 SOUND 1,-15, 20+4*noi
se,20
50 NEXT noise
```

Here you can see that after the first six notes – one sounding and five in the queue – the messages appear at one second intervals.

This is because the program has to wait for a space in the queue before it can print the message. Then as soon as it's done this it runs into the next line's SOUND command and so the program hangs again.

So, from what we've covered so far, you should see that the Electron's OS has a queue for storing commands. The capacity of the queue is limited and once it is full any program running has to wait until a vacancy occurs.

Making programs hang is just one problem caused by the queue. There is another.

Imagine a game where you're quite happily zapping aliens. Each time one bites the dust you get a satisfying explosion. These sounds will go into the sound queue.

Now suppose that you're zapped (it comes to us all). The program should make a sad losing noise but what happens if the sound queue is still full of explosions?

What we need is a way to tell the Electron: "Forget the note that's playing, ignore the queue – this is the noise that comes next".

We do this by fiddling with the *channel* parameter of the SOUND command. Program IV shows this in action:

```
10 REM PROGRAM IV
20 FOR noise=1 TO 50
30 PRINT "Noise number:
";noise
40 SOUND &11,-15, 20+4*n
oise,20
50 NEXT noise
```

What's happening is that we've put *&1* in front of the *channel* parameter in line 40. This has told the Electron that this is the noise to make next, and it's to make it immediately.

As the FOR . . . NEXT loop is producing 50 notes, one after the other, each note cuts short the preceding one. Only the final note runs for the full second.

The slightly less frenetic Program V shows the use of *&1* in front of the *channel* parameter. Notice that lines 30 and 50 hold up the program, waiting for a key to be pressed:

```
10 REM PROGRAM V
20 SOUND 1,-15,50,200
30 wait=GET
40 SOUND &11,-15,90,40
50 wait=GET
60 SOUND 1,-15,50,200
```

Line 20 produces a sound which, in the normal course of things, would last for 10 seconds. As the sound queue is empty, the program carries on to line 30 and waits for you to press a key. When you do it goes on to line 40.

Because line 40 has *&1* in front of the SOUND command's *channel* parameter, the Electron immediately plays

→

From Page 23

this note. The first note, if it's still playing, is cut short.

The program then goes on to the next line which again holds things up until a key is pressed. When this happens, it moves on to the SOUND command of line 60 and, if the note produced by line 40 is still playing, puts it in the queue.

So to have a note played immediately we put *&1* in front of its *channel* parameter.

You'll notice that in all the examples so far I've stuck to a *channel* parameter of 1. This makes sense because the Electron only has one sound channel, as opposed to the noise channel we'll be coming to later.

However you might remember I told you that in order to be compatible with the BBC Micro, the Electron would also accept *channel* parameters of 2 and 3. It will, but be careful.

On the BBC Micro you have three channels and all three can play a note at the same time, producing chords. On the Electron, although *channel* can be 2 or 3, only one note is played at a time.

And if you chop and change channels in an Electron program you might not get the effects you want. Take a look at Program VI:

```
10 REM PROGRAM VI
20 SOUND 1,-15,50,80
30 wait=GET
40 SOUND 2,-15,150,80
```

Notice that when you press a key in order to satisfy line 30, the first note immediately ends and the second begins. This is because they are using different *channel* parameters, 1 and 2.

When the Electron comes across a *channel* parameter which is different from the one it's been playing notes on, it stops using the old channel immediately.

Any note that is playing is cut short and the queue ignored, while the note with the new *channel* parameter is played.

The effect is exactly the same as if you had used the same *channel* parameter but with *&1* put in front of it.

Program VII shows this. Each time you press the key, the note that is playing is cut short because the following SOUND command is on a different channel.

```
10 REM PROGRAM VII
20 SOUND 1,-15,50,200
30 wait=GET
40 SOUND 2,-15,98,40
50 wait=GET
60 SOUND 1,-15,50,200
```

So, you might ask, why bother using *&1* at all? Why not just use a different channel for the note you want to be played immediately?

There are two reasons.

The first is that it can get complicated switching channels all the time. It's much easier to debug programs that use *&1*.

The second is that you might want to run your programs on a BBC Micro sometime. If you've used different *channel* parameters to give certain notes priority, your sounds will be a bit weird.

The BBC Micro will try to play both notes at the same time on different channels. This isn't always pleasant!

Value	Noise
0	High pitch
1	Middle pitch
2	Low pitch
3	As 1
4	Short periodic
5	Medium periodic
6	Long periodic
7	As 5

Figure II: The noise channel

This is also why noises made by programs written for the BBC Micro can sound a bit strange on the Electron. If they try to use all three channels at the same time, the Electron interprets this as three notes one after another.

Since the *channel* parameter is changing, so the notes cut each other short, with the odd sounding results.

Finally, what if the *channel* parameter is 0? Try Program VIII which demonstrates the various sounds available on this, the noise channel:

```
10 REM PROGRAM VIII
20 FOR noise=0 TO 7
30 SOUND 0,-15,noise,60
40 SOUND 0,-0,noise,20
50 NEXT noise
```

As you'll have heard, when the *channel* parameter is 0 you get six different noises.

Notice that with the noise channel, the *pitch* parameter is used in a rather different way. It can only have values from 0 to 7. Each value – except 3 and 7 – produces a different kind of noise. This is shown in Figure II.

The values 3 and 7 are just there for compatibility with the BBC Micro. On the Electron they just repeat the sounds produced by *pitch* parameters of 1 and 5.

And that's it for this month. I'll leave you to experiment with the various strange sounds available on the noise channel. Have fun. Next month we're going to lick the ENVELOPE command.


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This month it's very much a sound and graphics show. Next month who knows? It's up to you.

So if you enjoy messing about with your Electron and want to share your discoveries with other Electron users, send them in to us.

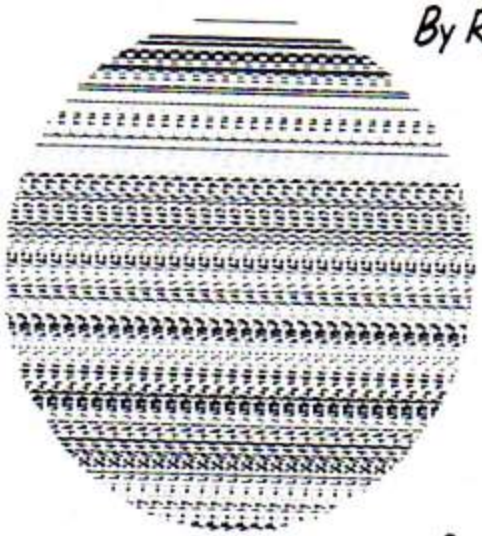
BACH

John Close uses the function keys to turn your Electron into an organ

```
10 REM BACH
20 REM JOHN CLOSE
30 REM USE THE FUNCTION
KEYS!
40 MODE6
50 VDU23,1,0;0;0;0;
60 PRINTTAB(17,11)"B A C
H"
70 PRINTTAB(11,13)"Phras
e now playing:"
80 *KEY1"cdedqfedefqfade
f!M"
90 *KEY2"eCfDqEfDqEDCbaq
d!M"
100 *KEY3"eCfCqCaCfDqDaDb
D!M"
110 *KEY4"cedfegacbDCbCDE
b!M"
120 *KEY5"ECDbCabqCbCabqa
f!M"
130 *KEY6"fgabqabCabCDbCD
E!M"
140 *KEY7"cEdDeCfbqabfCeD
d!M"
150 *KEY8"EeDdCcdDEDCbaqf
e!M"
160 *KEY9"qCaDbEDbDaCqbfa
b!M"
170 *KEY0"eCfDdbeCcadbdbe
C!M"
180 S$=" c d ef g a bC D
E F G A B"
190 REPEAT
200 INPUTTAB(12,15) T$
210 FOR N%= 1 TO LEN T$
220 P%= INSTR(S$,MID$(T$,
N%,1))
230 SOUND 1,-15,P%*4, 4
240 NEXT
250 UNTIL FALSE
```

LAMP SHADE

By Rog Frost



```
10 REM***LAMPSHADE***
20 REM***BY ROG FROST***
30 MODE5
40 VDU23;8202;0;0;0;
50 REPEAT
60 PROCCIRCLE(640,512,50
5,RND(4),RND(4),RND(20))
70 UNTIL0
80 END
90 DEFPROCCIRCLE(X,Y,R,C
,S,L)
100 LOCALI,J
110 FOR I=Y+R TO Y-R STEP
-L
120 S=S+1
130 C=C+1:IF C>7C=1
140 GCOLS,C
150 J=SQR(ABS(R*R-(I-Y)*(
I-Y)))
160 MOVE X-J,I
170 DRAWX+J,I
180 IF INKEY(-74)VDU19,RN
D(3),RND(8)-1,0,0,0
190 NEXT
200 ENDPROC
```

PLAYTIME

Stunning Ripple patterns from P. Bhandari

```
10 REM PLAYTIME
20 REM P.BHANDARI
30 MODE 2
40 VDU 23,1,0;0;0;0;
50 step%=8
60 end%=8
70 col%=0
80 FOR mix%=0 TO 4
100 FOR x%= 0 TO 1279 STE
P step%
110 col%=col%+1: IF col%=
end% col%=1
120 GCOL mix%,col%
130 MOVE x%,0
140 DRAW 1279-x%,1023
150 NEXT
170 col%=0
180 FOR y%=0 TO 1023 STEP
4
190 col%=col%+1:IF col%=e
nd% col%=1
200 GCOL mix%,col%
210 MOVE 1279,1023-y%
220 DRAW 0,y%
230 NEXT
250 NEXT
260 REPEAT UNTIL FALSE
```

BLOX

A light and sound show from John Close

```
10 REM BLOX
20 REM JOHN CLOSE
30 REM PRESS KEY FOR A N
EW PATTERN
40 VDU 23,221,255,255,25
5,3,3,3,3,3
50 VDU23,222,255,255,255
,192,192,192,192,192
60 duff$=CHR$(222)+CHR$(
221)
70 ENVELOPE 3,2,3,4,-230
,-230,-230,-10,126,0,0,-126
,126,126
80 REPEAT
90 MODE2
100 VDU 23,1,0;0;0;0;
110 FOR I%=1 TO 255
120 COLOUR 128+RND(5)+1:G
COL0,RND(5)+1
130 X%=RND(20)-1
140 X1%=RND(20)-1
150 Y%=RND(28)
160 Y1%=RND(28)
170 PRINTTAB(X%,Y%)duff$;
180 PRINTTAB(X1%,Y1%)duff
$;
190 PRINTTAB(X%,Y%)duff$;
200 PRINTTAB(X1%,Y1%)duff
$;
210 SOUND 1,3,I%,X% DIV 9
220 NEXT
230 A=GET
240 UNTIL 0
```

```
10 REM LIGHTS
20 REM JOHN CLOSE
30 MODE 2:X=3.5
40 VDU23,1,0;0;0;0;
50 REPEAT
60 FOR J=1 TO 20 STEP X
70 FOR K=1 TO 20 STEP X
80 COLOUR RND(6)+128
90 GCOL0,RND(15)+1
100 PRINT TAB(J,K+5)CHR$3
2
110 PRINT TAB(K,J+5)CHR$3
2
120 NEXT:NEXT
130 UNTIL FALSE
```

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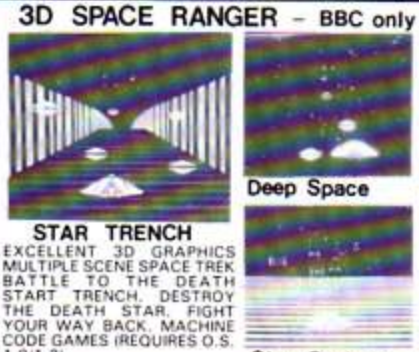

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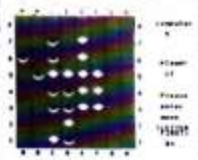

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Help save the Ospreys!

Osprey!
Bourne Educational Software

I WAS lucky enough to be able to spend two weeks in Scotland this summer and the highlight of the trip was my visit to see the nesting Ospreys at Loch Garten.

So, when Osprey! arrived in the office, I grabbed it with enthusiasm.

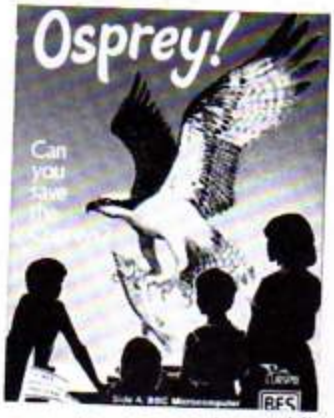
Produced in conjunction with the RSPB, and with an excellent 32 page colour booklet to complement the program, it's a fascinating simulation of the problems faced by the osprey as a Scottish breeding bird.

You take the part of the manager of a nature reserve where ospreys are nesting. The booklet has given you an outline of the history of the osprey and you have to pick which year you want the simulation to start.

The earlier the year, the harder the game is. Your aim is to make sure that the birds successfully breed and rear their chicks.

To do this, you have to decide what your limited number of wardens is going to do during the vital spring and summer seasons.

Some are needed to chase



away the egg stealers, while others have to manage the site and keep disturbance from the visitors to a minimum. Also wardens have to be spared to make people aware of the ospreys and to encourage public support.

And, just like real life, when you've made your choices and allocated your resources you have to sit back and watch what happens.

The graphics are beautiful, painting a picture of the reserve and the nest site. You can watch the ospreys as they swoop down to fish and take them to the nest.

Sadly, if you haven't allocated enough wardens to guard duty, you can also watch the egg thieves at work. Even the visitors can be a nuisance, their cars disturbing the birds if you haven't picked the right number of site wardens.

And to make it worse, factors totally out of your control such as the weather affect the final result.

Your success or failure at one reserve is taken as representative of the whole of Scotland and after the spring season you're shown how the osprey popularion has fared under your protection.

You continue until you reach the year 1981 or you've run out of ospreys – a horrible thought. You can then compare your efforts with the magnificent results the RSPB achieved in reality which are shown in the booklet.

It's a smashing program. The instructions, both in the booklet and on the screen are excellent. The graphics and animation are more than adequate and the whole package has the quality that we've come to expect from Bourne.

Even the fact that it's educational – the well-illustrated booklet has a history of the Osprey and a things-to-do section – doesn't spoil the fun.

So if you haven't been to Loch Garten yet, you can console yourself playing Osprey! until you get the chance.

Nigel Peters

New pictures every day

Electronic Colouring Book
Addison-Wesley Software

MANY years ago, when playing with jigsaws was more fun than VDU codes, I used to love painting by numbers.

There were two main problems, however. The first was that I was too impatient to wait for the colours to dry so that they ran together.

The other drawback was

→

Safari fun for all – with no blood

Jungle Jive
Virgin Games

IN a time when the big game hunter is thankfully a thing of the past, Jungle Jive lets you release your aggressive instincts without spilling blood.

It brings all the excitement of a jungle safari onto your TV screen.

You control a little man who waddles up and down the centre of the screen. The idea is that you blast away at the animals who are closing in on

you to your left and right. You get points for each one you hit although I pretend they're just tranquillising darts.

As you're getting yourself a life ban from the RSPCA, avoid the slithering snake who dashes about at random trying to avenge all those departed elephants, crocodiles, lions and birds.

Whatever you do, don't shoot the cute little baboons which line your path. They protect you and you'd better protect them or else you're finished.

And don't try to shoot the blue hippo. Bullets bounce off him.

You start off with the usual three lives, gaining bonus lives as your point score mounts. You lose them as you bump into things and things bump into you.

It's a nice action game that promises fun for all the family – once you've settled the arguments over who's going next.

Keith Young

From Page 29

that each picture could only be painted once, so I couldn't experiment with colours as much as I liked.

I would have loved a system which allowed me to dabble, change colours as I wanted, and where every new day meant a fresh lot of clean pictures.

Well, rather late for me, but still good fun comes this tape which is compatible with both the Electron and the BBC Micro.

Although only priced at £9.95 – a modest enough figure nowadays – it contains no fewer than 18 pictures waiting for your artistic talents.

The first four each have a file which allows the correct colours to be loaded onto the picture by first loading the picture file itself followed by the colour file.

The remaining 14 pictures do not have this facility, but this gives full rein to your imagination.

By the way, how many colours would you expect your Electron to support? Wrong! There is a palette of 35 available, including greys, pinks and so on and an area is easily filled using machine code.

A cursor is moved around the screen, and on moving into the palette can select the painting colour. By then moving the cursor to an area, it can easily be filled with the P (paint) key.

Similarly, it may be recoloured by D (delete), selecting another palette colour and then painting once more.

The speed of the fill is quite impressive as is the speed of the cursor. The picture as drawn is not final, as a mode may be selected in which it is possible to add lines exactly as required.

Thus the picture of the clown might be improved by the addition of some balloons which can be added easily.

Indeed, it is quite possible and fun to go immediately into drawing mode without loading a picture, and thus create a picture from scratch which can then be coloured using the palette. The finished result can be saved to cassette.

An amusing but not over-useful feature is the facility to randomly alter the colours on a displayed picture, or to cycle through the basic colours in order.

The cassette box claims this program will interest those from six to 96. Well, my three and five year olds would like to be added to that list as they both think it's smashing fun.

I don't think they realise there is quite a large educational content to the program, with much evidence of planning, hand-eye coordination and discussion leading to the final polished result.

Whether it would be of real practical use in schools on cassette is doubtful. There are so many parts of the program that it cries out to be put onto disc for easier access of a particular picture, or for rapid saving of little Johnny's masterpiece.

Apart from that reservation, I am most impressed.

Phil Tayler

Defend the fleet

3D Bomb Alley
Software Invasion

IS it because war is so much fun that we turn it into games? Or is it because we play so many war games that we go so eagerly to war?

These were some of the more serious thoughts sparked off by playing Software Invasion's game 3D Bomb Alley.

Mind you, there isn't too much time to think when you're actually playing the game!

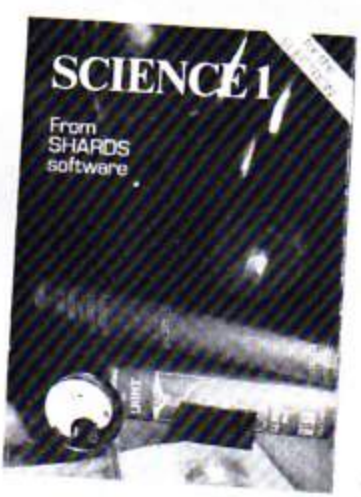
The scenario is obviously based on San Carlos Bay in the Falklands. Your fleet is at anchor in a narrow sea inlet and you are under attack from enemy planes. These appear in the far distance but rapidly grow larger as they near.

To defend yourself you have to throw up a barrage of anti-aircraft fire. The trouble is that, although you can miss the planes, if they get through they don't miss you.

You get an extra ship for each 10 planes downed and the game ends when you've

A well produced bunch

Science 1
Shards



THIS package consists of four separate programs on balances, meter reading, thermometer reading and lenses.

The meter program is on twice, in Mode 1 and in Mode 0. The Mode 0 version added nothing – I preferred the extra colours of Mode 1.

The introductory program has a noisy title plus an index. I expected the index to give single letter entry to load a program, but the options are to see the index or leave the program.

Leaving the program gives you a blank screen and it is necessary to CHAIN whichever program you want.

The trouble is, you've now forgotten their names and the sheet of information has different titles for them.

The balancing program collects your name, then gives a menu of options. You have to decide whether to be nice or nasty – there is no explanation as to what this means at this stage!

The program gives practice in working out how to balance see-saws. The explanation is rather sketchy, but if you do get the answer correct a little diver hurls himself into a cup of liquid or, if you chose nasty, he goes splat on the floor.

If you get the answer wrong, large arrows indicate which way the see-saw tips, and then the diver splats if you are nice or splashes if you are nasty.

The meter reading program provides practice on reading the two most common school meter scales. It is well constructed, making good use of large text, and with an option to magnify the relevent part of the scale.

The program is rather fussy, four key presses are required before an answer is put in.

The thermometer program is very similar to the meter program. It provides practice in reading 0-100°C, 0-250°F and clinical °C thermometers.

Light provides a lesson in ray optics at concave/convex lenses/mirrors. It is again well constructed using good text and attractive, simple graphics. The whole program is rather slow, particularly the 16 questions.

Overall these are well-produced programs with the meter and thermometer sections the pick of the bunch.

The major disadvantage of this educational package is total non-compatibility with the BBC Micro. If these programs are run on a Beeb, they have a nasty little trick – they clear the micro's memory.

Many schools have BBCs and Electrons. I would choose a program that would run on both machines to use in my school.

Rog Frost

lost your last ship.

It's a simple game with nice graphics and adequate instructions. The way the planes appear in the distance and then grow larger is a good technique but it's annoying when they slow down and even appear to stop when under fire. You can almost feel the micro thinking.

At first I thought that that would mean a slow game, but I soon learned differently as the planes came in at me five at a time.

The main difficulty comes from the increasing number of enemy planes. If you like action where quick reactions are at a premium then this is the one for you.

Eileen Young

Command a missle silo–it's not easy!

3-D Tank Zone
Dynabyte

IT'S not easy being the commander of a missile silo.

First there are the aircraft attacking you, then there are the tanks. And you're stuck in a hole in the ground with only anti-tank missiles and an anti-aircraft gun to ward off this unprovoked aggression. All the time your energy is getting lower and the shields weaker.

No, it's not easy . . .

Still, if you think you could do any better, have a go at 3-D Tank Zone.

Your Electron's screen becomes a view from the silo as you scan for the enemy. As you guide the sights of your AA gun to attack the jets and helicopters on the horizon, you have to watch the radar for tanks.

When you see one you have to turn the turret and loose off a missile, quick. At first the action seems a little slow but as the tanks get nearer and your energy drops it's all too fast.

The graphics are simple but effective. The tanks appear in 3D wire form and the missiles fly in an annoyingly realistic manner. I say annoying

because of the way they miss.

The instructions are thorough and the key controls are well-laid out.

It's an interesting game, very different from anything else I've seen for the Electron. While not the fastest program around, it should suit those looking for a change from the usual arcade remakes.

Well worth looking at.

Tony Sinclair

Enter the arena and battle it out

Arena 3000
Microdeal

IMAGINE that you're suddenly transported forward in time to the year 3000 AD. You find yourself the star of the chief entertainment of the time – the arena – where humanoids battle with mutants.

Your only defence is a death ray and you need it. If you're touched just once by a mutant you die. And some of the monsters take several blasts before they decide to die and leave you in short-lived peace!

A nightmare? No, just a brief description of Arena 3000. You, of course, play the part of the humanoid, starting with three lives but soon losing them.

Each mutant you kill adds to your points score and the cassette inlay tells you that you gain an extra life for every 20,000 points you score.

I wouldn't know as by then I've been swamped by mutants such as *The Dreaded Oh Nos* or the *Jovial Jovian Jumpers.*

If they're jovial I don't get the joke.

And of course, every time you clear a wave of mutants along comes another of a different type.

It's not easy but it is fun. With either keyboard or joystick control, sound on/off and pause facilities and a Hall of Fame, the game is well up to standard.

The graphics are very good and the use of sound reasonable. A good version of an arcade classic.

Keith Young

Not for mere mortals... it's just too good

Nightmare Maze
MRM Software

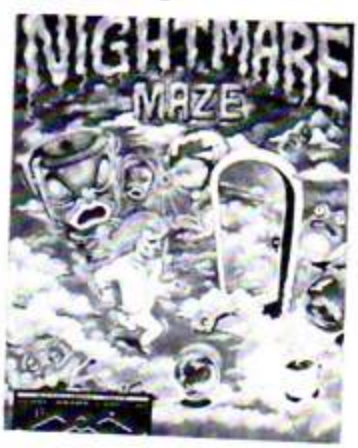
NIGHTMARE Maze, written by Mike Williams, is a descendant of Pac Man, which was popular ages ago in the arcades. Although it is easy to see the origins, the game is completely different to play.

Instead of running around the maze in between the walls, you actually run on top of them. They are drawn in perspective, as if you were looking down at an angle.

There are four screens, each with a different maze and monsters. The first is inhabited by springy things, the second by bouncing balls, the third by deadly frogs, followed by hungry hoppers. I can't confirm the last two as I always got bounced on the second screen.

The object of the game is to collect a number of keys which appear around the maze. On acquiring the last you can unlock the door which leads to the next screen.

The inhabitants of the maze don't chase you, they move in



fixed patterns. The routes taken are sufficiently complex as to make it very difficult to remember more than the first few.

Help is at hand in the form of a cup of black coffee. Drinking this awakes you from your nightmare and the nasties disappear. You soon start to dream again so you must rush round collecting the keys as fast as possible before they reappear.

The graphics are excellent and the animation very smooth with good sound to accompany the springy/bouncy hoppers.

Having said that though, I honestly didn't enjoy playing this game, the reason being that it is just too difficult and too frustrating. Maybe I'm just too old!

Not once in three weeks have I made the high score table, not even the bottom position.

The man is difficult to control when the monsters disappear, often running straight past the path you wish to turn and run along, and when you are caught, all the keys you have so painstakingly collected are lost and you must start again.

This game is for advanced arcadians only, providing an exciting new challenge to their skill. Us ordinary mortals haven't a chance, it really is a nightmare!

Roland Waddilove

Christmas Box

A game of strategy by JOHN WOOLLARD

CHRISTMAS Box is a game of strategy designed to while away a pleasant time after a substantial Christmas dinner.

The rules are simple: Two players take turns to enter a Christmas Box into the grid by pressing a letter key from A to F.

The piles of presents build up to the top, but no further, to the accompaniment of *We Wish You A Merry Xmas*.

Q cuts the music. S starts it again.

The winner is the first person to get four of their presents in a straight line – vertically, horizontally or diagonally.

If you don't want to type the whole thing by hand then send off for this month's tape. If you want to learn some new techniques to aid your programming then read on.

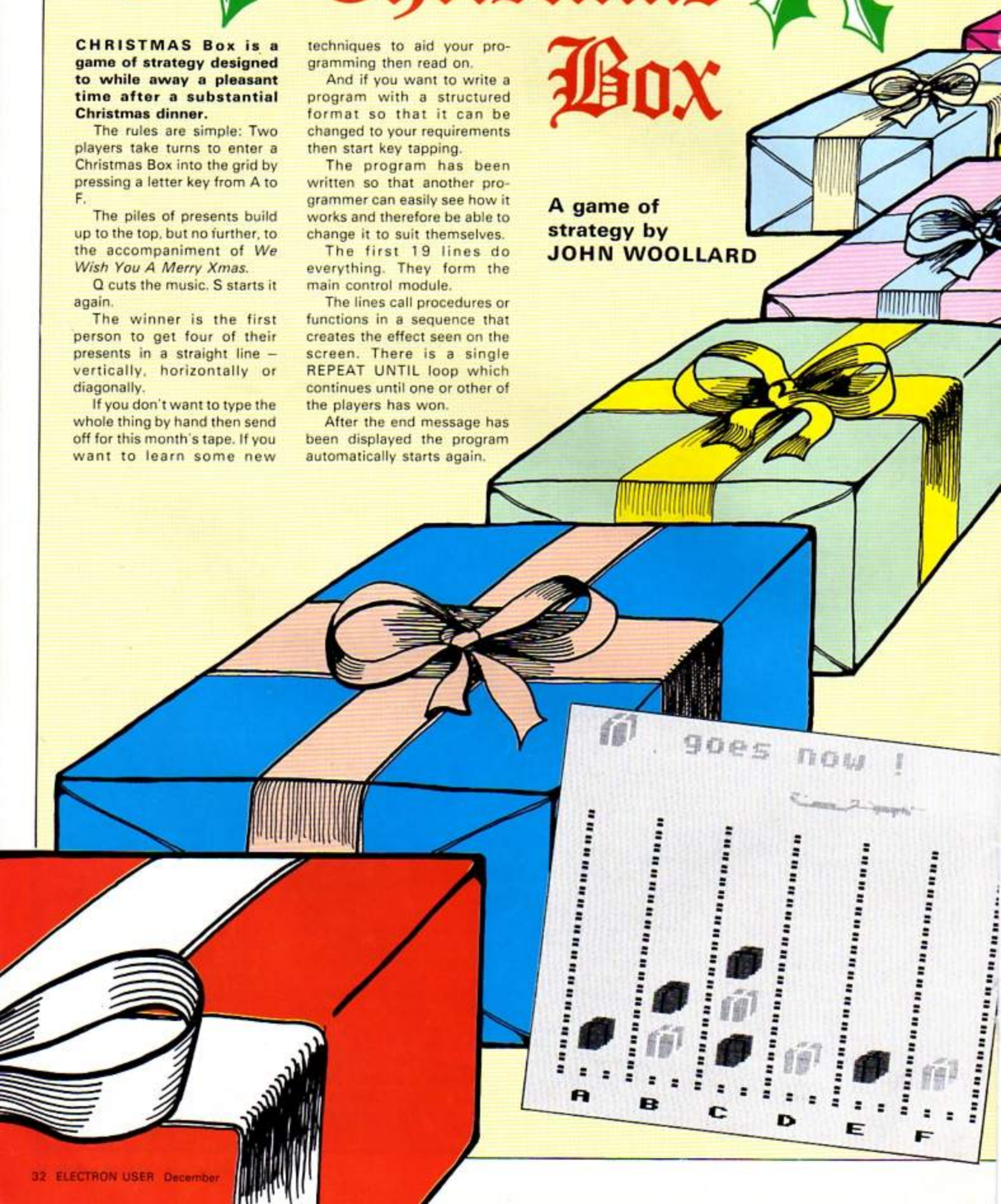
And if you want to write a program with a structured format so that it can be changed to your requirements then start key tapping.

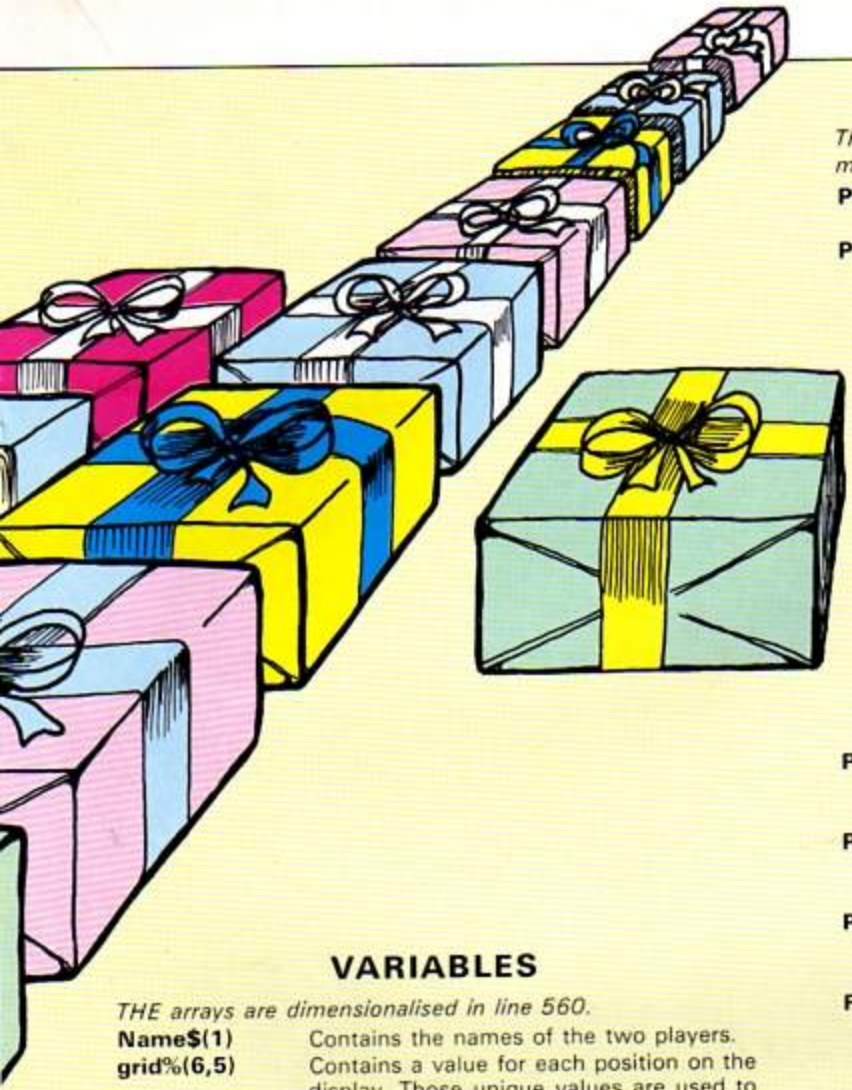
The program has been written so that another programmer can easily see how it works and therefore be able to change it to suit themselves.

The first 19 lines do everything. They form the main control module.

The lines call procedures or functions in a sequence that creates the effect seen on the screen. There is a single REPEAT UNTIL loop which continues until one or other of the players has won.

After the end message has been displayed the program automatically starts again.





VARIABLES

THE arrays are dimensionalised in line 560.

Name$(1)	Contains the names of the two players.
grid%(6,5)	Contains a value for each position on the display. Those unique values are used to determine if a player has a winning combination of Christmas Boxes.
win%(40)	Contains the totals of the 39 winning positions.
pitch%(54) and **duration%(54)**	Contain the pitch and duration of the 54 notes of the tune that plays during the game.
win%	A flag that starts at zero and becomes positive to show that a player has achieved a winning position.
person%	Either 1 or 0 and indicates which player's turn it is.
k, k1, k2 . . .	General purpose counters that do not cross procedure boundaries.
shape$	Contains a string that produces the moving sleigh at the top of the screen.
T%	Used to count through each note of the tune and determine the position of the sleigh on the screen.
get%	Stores the value of the player's choice of letter.
I and **inkey%**	Temporary stores of the result of an inkey statement.

MODIFICATIONS

THE program was designed to be flexible in its use. The tune can be changed by changing the values in the data statements of lines 1760 and 1770. The shape of the Christmas Boxes can be changed entirely by altering lines 1690 to 1720.

The shape of the moving sleigh is set in line 470.

Obviously, all text can be changed by changing the appropriate PROCPrint calls.

PROCEDURES AND FUNCTIONS

THE following procedures and functions are called from the main control module:

PROCtitle	Sets up the initial screen with a display of grid and title.
PROCinitialisation	Dimensions all variables used, reads the data statements and assembles a machine code routine that creates double height characters. (That routine was described and explained in the July edition of *Electron User.)* The initialisation procedure also contains several *FX calls which are useful in many programs. *FX16,0 disables the analogue/digital sampling. This is an advantage only if the Plus 1 is fitted. *FX229,1 disables the action of Esc. It may be useful to set it to *FX229,0 while debugging is carried out. The other *FX calls are documented in the Electron User Guide.
PROCnamein	Allows the two players to enter their names and wishes them luck.
PROCdisplay	Creates an empty grid for the players to enter their Christmas Boxes.
PROCplay	Waits for the player to make a choice and enters the Christmas Box.
FNcheck	Checks to discover if that move was a winning move. If it was then *win%* is set to a positive value.
PROCendmessage	Displays its Christmas Greetings when the loop ends.
PROCget	Waits for a letter key to be pressed between A and F. However, if Q is pressed the sound is quietened, if S is pressed then it is enabled. The procedure uses *FX210,0 to enable all sound output and *FX210,1 to disable all sound output.
FNname	An input routine that prints the inputted characters in double height to a maximum length of 12 characters.
PROCPrint (x,y,COL,a$)	Utilises the machine code routine created in the initialisation procedure so that whole strings can be printed in double height.
PROCshape (shape%, colour%,xcoord%, ycoord%)	Displays a coloured shape determined by the value of *shape%* and *colour%* at a position on the screen determined by *xcoord%* and *ycoord%*.

DATA

IT IS most important that these statements are entered accurately as mistakes may not appear as syntax errors but as spurious errors whose source is hard to determine.

Lines 1730, 1740 and 1750 contain the winning combinations. Lines 1760 and 1770 contain the notes of the tune.

Full listing starts on Page 34

Christmas Box listing

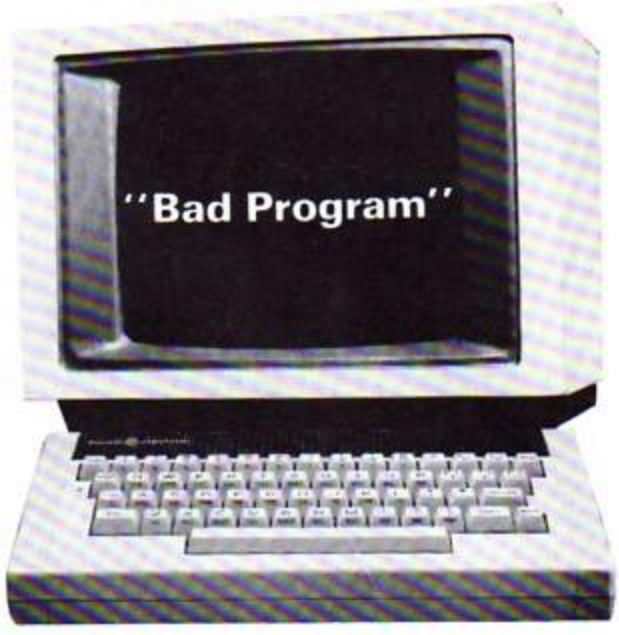
From Page 33

```
   10 REM Christmas Box
   20 REM John Woollard
   30 REM (C) Electron User
   40 REM Happy Christmas
   50 Program$="Christmas B
ox"
   60 MODE2:VDU23,1,0;0;0;0
;0
   70 COLOUR132
   80 PROCtitle
   90 PROCinitialisation
  100 PROCnamein
  110 PROCdisplay
  120 go%=0:win%=0
  130 REPEAT:go%=go%+1
  140 person%=go%MOD2
  150 PROCplay
  160 win%=FNcheck
  170 UNTILwin%
  180 PROCendmessage
  190 RUN
  200 DEFPROCtitle
  210 CLS
  220 COLOUR8
  230 PRINTTAB(10-LEN(Progr
am$)DIV2,1)Program$
  240 COLOUR7
  250 FORk1=1TO20:FORk2=0TO
6
  260 PRINTTAB(1+3*k2,7+k1)
;":  "
  270 NEXT:NEXT
  280 PRINTTAB(1,28);STRING
$(19,":");
  290 FORk1=1TO5:FORk2=1TO6
  300 PROCshape(1,RND(16)-1
,k2*191-50,k1*110+120)
  310 NEXT:NEXT
  320 COLOUR6
  330 PRINTTAB(2,3)"See Ele
ctron User"
  340 PRINTTAB(2,4)"for ins
tructions."
  350 COLOUR7
  360 ENDPROC
  370 DEFPROCinitialisation
  380 DIM dblp &FF:FOROpt=0
TO2STEP2:P%=dblp:[OPT Opt:S
TA&70:STX&79:STY&7A:LDA#10:
LDX#&70:LDY#0:JSR&FFF1
  390 LDA#23:JSR&FFEE:LDA#2
55:JSR&FFEE:LDA&71:JSR&FFEE
:JSR&FFEE:LDA&72:JSR&FFEE:J
SR&FFEE:LDA&73:JSR&FFEE:JSR
&FFEE:LDA&74:JSR&FFEE:JSR&F
FEE:LDA#31:JSR&FFEE:LDA&79:
JSR&FFEE:LDA&7A:JSR&FFEE:LD
A#255:JSR&FFEE
  400 LDA#23:JSR&FFEE:LDA#2
55:JSR&FFEE:LDA&75:JSR&FFEE
:JSR&FFEE:LDA&76:JSR&FFEE:J
SR&FFEE:LDA&77:JSR&FFEE:JSR
&FFEE:LDA&78:JSR&FFEE:JSR&F
FEE:LDA#31:JSR&FFEE:LDA&79:
JSR&FFEE:LDA&7A:ADC#1:JSR&F
FEE:LDA#255:JSR&FFEE:RTS:]:
NEXT
  410 *KEY10OLD!ML.!N!M
  420 *FX16,0
  430 *FX4,1
  440 *FX210,0
  450 *FX11,0
  460 *FX229,1
  470 shape$=CHR$32+CHR$249
+CHR$254+CHR$253+CHR$252+CH
R$251+CHR$250+CHR$8+CHR$8+C
HR$8+CHR$8+CHR$8+CHR$8
  480 VDU23,254,0,0,0,0,255
,255,255,255
  490 VDU23,253,7,5,1,3,7,1
2,248,240
  500 VDU23,252,16,8,7,7,25
5,7,2,2
  510 VDU23,251,0,1,255,255
,253,252,8,8
  520 VDU23,250,32,62,128,1
92,192,192,0,0
  530 VDU23,249,224,100,128
,192,192,96,63,31
  540 ENVELOPE1,1,48,96,48,
1,1,1,126,0,0,-126,126,126
  550 T%=-1
  560 DIMName$(1),grid%(6,5
),score%(1),total%(1),win%(
40),pitch%(54),duration%(54
)
  570 FORk1=1TO39:READwin%(
k1):NEXT
  580 FORk1=1TO5:FORk2=1TO6
  590 grid%(k2,k1)=2^(k1+(k
2-1)*5)
  600 NEXT:NEXT
  610 len%=54
  620 FORk1=0TOlen%
  630 READpitch%(k1),durati
on%(k1)
  640 NEXT
  650 ENDPROC
  660 DEFPROCnamein
  670 CLS:PROCPrint(1,2,130
,"Hello,")
  680 PROCPrint(1,5,130,"Pl
ease type in your")
  690 PROCPrint(1,8,130,"na
me then [RETURN]")
  700 *FX21
  710 Name$(0)=FNname
  720 CLS:PROCPrint(1,2,130
,Name$(0))
  730 PROCPrint(1,5,130,"Pl
ease type in your")
  740 PROCPrint(1,8,130,"fr
iend's name ")
  750 *FX21
  760 Name$(1)=FNname
  770 CLS
  780 PROCPrint(4,4,130,Nam
e$(0))
  790 PROCshape(0,1,100,880
)
  800 PROCPrint(4,7,130,Nam
e$(1))
  810 PROCshape(1,2,100,760
)
  820 PROCPrint(1,18,130,"G
ood Luck"):*FX21
  830 I=INKEY(300):CLS:ENDP
ROC
  840 DEFPROCdisplay
  850 COLOUR7
  860 FORk1=1TO20:FORk2=0TO
6
  870 PRINTTAB(1+3*k2,7+k1)
;":  "
  880 NEXT:NEXT
  890 PRINTTAB(1,28);STRING
$(19,":");
  900 FORk2=1TO6
  910 PRINTTAB(3*k2-1,30);C
HR$(k2+64)
  920 NEXT
  930 PROCPrint(4,1,129," g
oes now !")
  940 ENDPROC
  950 DEFPROCplay
  960 PROCshape(person%,per
son%+1,100,975)
  970 REPEAT
  980 PROCget
  990 IFgrid%(get%,0)=5THEN
SOUND1,-15,23,20:get%=0
 1000 UNTILget%>0
 1010 PROCshape(person%,per
son%+1,get%*191-50,grid%(ge
t%,0)*110+220)
 1020 grid%(get%,0)=grid%(g
et%,0)+1
 1030 total%(person%)=total
%(person%)+grid%(get%,grid%
(get%,0))
 1040 ENDPROC
 1050 DEFFNcheck
 1060 check%=0
 1070 FORk1=1TO39
 1080 IF(total%(person%)AND
win%(k1))=win%(k1)THENcheck
%=k1
 1090 NEXT
 1100 =check%
 1110 DEFPROCendmessage
 1120 FORk1=1TO5:FORk2=1TO6
 1130 IF(win%(win%)ANDgrid%
(k2,k1))=grid%(k2,k1)THENPR
OCshape(3,8,k2*191-50,k1*11
0+120)
 1140 NEXT:NEXT
 1150 PROCPrint(4,1,129,STR
ING$(12," "))
 1160 PROCPrint(4,1,129,Nam
e$(person%))
 1170 *FX21
 1180 inkey%=INKEY(900)
 1190 CLS
 1200 PROCPrint(1,1,129,Nam
e$(person%))
 1210 PROCPrint(1,4,129,"is
 the winner")
 1220 PROCPrint(1,9,129,"Me
rry Christmas")
 1230 PROCPrint(1,11,129,"f
rom all at")
 1240 PROCPrint(1,13,142,"E
lectron User")
 1250 PRINTTAB(1,29),"Press
 Return"
 1260 *FX21
 1270 REPEAT:UNTILGET=13
 1280 ENDPROC
 1290 DEFPROCget
 1300 *FX21
 1310 REPEAT
 1320 T%=T%+1
 1330 IFT%MOD14=0THENPRINTT
AB(0,4)STRING$(40," ");
 1340 PRINTTAB(T%MOD14,5)sh
ape$;
 1350 SOUND1,1,pitch%(T%MOD
```

```
len%),duration%(T%MODlen%)/
1.3
 1360 SOUND1,0,0,1
 1370 inkey%=(INKEY(7)OR32)
-96
 1380 IFinkey%=17THENSOUND1
,0,0,99:*FX210,1
 1390 IFinkey%=19THEN*FX210
,0
 1400 UNTILinkey%>0ANDinkey
%<7
 1410 get%=inkey%
 1420 ENDPROC
 1430 DEFFNname
 1440 REPEAT
 1450 Name$=""
 1460 PROCPrint(1,11,130,ST
RING$(18," "))
 1470 REPEAT:G=GET
 1480 Name$=Name$+CHR$(G)
 1490 PROCPrint(1,11,130,Na
me$)
 1500 SOUND1,-15,230,1
 1510 UNTILG=13ORG=127ORLEN
(Name$)>12
 1520 UNTILG<>127ANDName$<>
CHR$13
 1530 =Name$
 1540 DEFPROCPrint(x,y,COL,
a$)
 1550 COLOURCOL-128
 1560 FORK=1TOLEN(a$)
 1570 A%=ASC(MID$(a$,K,1))
 1580 IFA%>127ANDA%<144THEN
COLOURA%-128:A%=32
 1590 IFA%<32THENA%=32
 1600 X%=x+K-1:Y%=y:CALLdbl
p
 1610 NEXT
 1620 COLOUR7
 1630 ENDPROC
 1640 DEFPROCshape(shape%,c
olour%,xcoord%,ycoord%)
 1650 GCOL0,colour%
 1660 GCOL0,128+(colour%-1)
*7
 1670 COLOURcolour%
 1680 MOVExcoord%,ycoord%
 1690 IFshape%=0THENPLOT1,0
,0:PLOT1,0,0:PLOT81,0,-50:P
LOT81,50,0:PLOT81,0,50:PLOT
81,-50,0:PLOT81,40,30:PLOT8
1,50,0:PLOT81,-40,-30:PLOT8
1,40,-20:PLOT81,-40,-30:PLO
T0,20,15:PLOT3,0,50:PLOT3,-
50,0:PLOT0,45,15:PLOT3,-40,
-30:PLOT3,0,-50:ENDPROC
 1700 IFshape%=1THENPLOT1,0
,0:PLOT1,0,0:PLOT81,0,-50:P
LOT81,50,0:PLOT81,0,50:PLOT
81,-50,0:PLOT81,40,30:PLOT8
1,50,0:PLOT81,-40,-30:PLOT8
1,40,-20:PLOT81,-40,-30:PLO
T0,20,15:PLOT3,0,50:PLOT3,-
50,0:PLOT0,45,15:PLOT3,-40,
-30:PLOT3,0,-50:ENDPROC
 1710 IFshape%=3THENPLOT0,0
,-25:VDU5:COLOUR15:PRINT"X"
:VDU4,23,1,0;0;0;0;0:COLOUR
1:ENDPROC
 1720 ENDPROC
 1730 DATA30,60,960,1920,30
720,61440,983040,1966080,31
457280,62914560,1.00663296E
9,2.01326592E9
 1740 DATA67650,2164800,692
73600,135300,4329600,138547
200,270600,8659200,27709440
0,541200,17318400,554188800
,1082400,34636800,1.1083776
E9
 1750 DATA532610,17043520,5
45392640,1065220,34087040,1
.09078528E9,69904,2236928,7
1581696,139808,4473856,1431
63392
 1760 DATA60,10,80,10,80,5,
88,5,80,5,76,5,68,10,52,10,
68,10,88,10,88,5,96,5,88,5,
80,5,76,10,60,10,76,10,96,1
0,96,5,100,5,96,5,88,5,80,1
0,68,10,60,5,60,5,68,10,88,
10,76,10,80,20
 1770 DATA60,10,80,10,80,10
,80,10,76,20,76,10,80,10,76
,10,68,10,60,20,88,10,96,10
,88,5,88,5,80,5,80,5,108,10
,60,10,60,5,60,5,68,10,88,1
0,76,10,80,20,252,0
```

This listing is included in this month's cassette tape offer. See order form on Page 47.

NOT SO BAD AS IT SEEMS



It happens to us all at some time or other! So let DAVE ROBINSON show you how to cope with that dreaded error message "Bad Program".

IF you've ever had the dreaded message "Bad Program" appear on your Electron's screen and been frustrated by the apparent loss of your programs, then this article is for you.

This loathsome error message usually occurs when you load a program from cassette, although it can happen if adventurous poking into memory goes astray.

What happened is that the Basic program memory has somehow been corrupted and the Electron can't deal with what it finds there.

In this article my aim is to show you when and how this condition will be met and, more importantly, what you can do about it.

Before I explain what checks are regularly conducted on your program in memory, I'll try and explain where and how your Basic programs are stored.

As I'm sure you are aware, the Electron stores Basic programs in a series of addresses in RAM starting at PAGE and ending at TOP-1.

PAGE and TOP are the names given to the address pointers signifying the start and end of the memory space occupied by the program. PAGE is set to address &E00 (3584 decimal) when you first switch on, though you can change this, as we will be doing later.

Each line of every Basic program is stored in a series of numbers. These represent the characters shown on the screen when listing a program. There are also four extra numbers, which will be explained shortly.

The numbers in memory are properly called bytes – a byte being the contents of the addresses referred to, and having a value between 0 and &FF (255 decimal).

Program I will display the memory of a Basic program, both the addresses and their contents being shown, with an explanation of each byte.

However, before you type it in, look at Figure I for an

Byte	Explanation	Value
1	Start of line	&D(13)
2	Line No.high	0-&7F(127)
3	Line No.low	0-&FF(255)
4	Length of line	5-&FF(255)

Figure I: The first four bytes

From Page 37

explanation of those four extra bytes in front of every line of your Basic program.

Byte 1 is always set to &D (13 decimal) to signify the start in memory of a line of Basic. Bytes 2 and 3 are the line numbers of your program. The number is held in two bytes as one byte can only hold values up to &FF (255 decimal).

Byte 4 is the total count of bytes in each line of Basic, including the four extra bytes.

The Electron takes care of all this itself. It only concerns you as a programmer when things go wrong or you wish to become ambitious and write utility programs like Program II.

The end in memory of any program is usually signified by having &FF (255 decimal) in byte 2. In practice any number above &7F (127 decimal) will be counted as the end.

Type in Program I carefully. Leave out the ON ERROR until you're sure it works.

Figure II shows a typical display from this program. The four columns are as follows:

Column 1 – *address in hex.*
Column 2 – *contents in hex.*
Column 3 – *contents in decimal.*
Column 4 – *explanation of byte.*

When you run Program I you'll be examining the program itself. This lets you compare the listing with the actual bytes stored in memory.

To freeze the display at any time press Ctrl and Shift together. To stop scrolling completely, press Esc.

The first four bytes have already been explained. Byte 5 and onwards are coded in memory as one of two things. It could be the Ascii code of the letter typed in – see the User Guide for a full set of Ascii character codes – otherwise it's a token number.

Each Basic keyword, such as PRINT, has its own special code called a token which allows it to only occupy one byte of memory.

```
  10 REM PROGRAM I
  20 MODE6:ON ERROR VDU26:
END
  30 PRINTTAB(3,1)"Address
"TAB(12)"Contents"TAB(24)"C
haracters"
  40 PRINTTAB(3,2)STRING$(
33,"=")
  50 VDU28,0,24,39,3
  60 addr%=PAGE
  70 end%=FALSE
  80 @%=8
  90 REPEAT
 100 PRINTTAB(3)STRING$(33
,"-")
 110 IF ?(addr%+1)>&7F THE
N end%=TRUE
 120 line%=?(addr%+3)
 130 FOR byte%=1 TO line%
 140 PRINT~addr%,~?addr%,?
addr%;SPC(3);
 150 IF byte%=1 PRINT"Star
t"
 160 IF byte%=2 PRINT"Line
High"
 170 IF byte%=3 PRINT"Line
Low"
 180 IF byte%=4 PRINT"Leng
th"
 190 IF byte%>4 AND ?addr%
>&7F PRINT"Token"
 200 IF byte%>4 AND ?addr%
<&7F PRINT CHR$(?addr%)
 210 addr%=addr%+1
 220 IF end%=TRUE THEN byt
e%=line%
 230 NEXT
 240 UNTIL end%=TRUE
 250 PRINT~addr%,~?addr%,?
addr%;SPC(3);
 260 PRINT"END"
 270 VDU26
 280 END
```

Program I

These two are easily distinguished by their value. Ascii codes stop at &7F while tokens range from &80 to &FF. Don't worry to much about tokens at this stage.

In case you have not used the ? or the ~ before, I'll say that the ? is to refer to the contents of an address. The ~ causes a number to be output in hexadecimal.

Before the Electron will allow you access to the program in memory it will check that each line conforms to the format in Figure I.

The two things that will cause the "Bad Program" error are either the first byte not being equal to &D (13 decimal) or the third byte being equal to zero.

These two checks are repeated for each line of Basic, the length of the line being added to the start address to find the address of the start of the next line.

With the knowledge gained, we turn now to consider how to recover from the bad program error.

What's needed is a short program that will examine the memory area and correct all the faults found. Program II is designed to do just that.

Before you look at the listing you must understand two more points about a Basic program.

The first is that there must be no byte after byte 4 which has a value in the range 0 to 19 (31 decimal). The reason is that these are special control codes for the Electron which won't like them being there.

The second point is that line numbers must always increase in value.

If these two points are not attended to, the recovered program may list but it would be difficult to correct.

Program II uses two procedures to correct them. PROCline counts the number of bytes in a line, replacing any bad bytes with &23 (the Ascii code for £). PROCnumber ensures that all the line numbers are in ascending order.

When you have typed in Program II do not try to run it until you have a copy safely tucked away on tape. As said at the beginning, programs that directly poke into memory can self destruct.

To use Program II to recover a bad program it follows that you must have a Basic program in memory that requires recovering. Just type in a simple program and poke a zero into the third byte with:

```
?&E03=0
```

This should effectively produce a bad program. Once you have got a program you want to recover, enter:

```
*OPT 2,0
```

to ensure that the Electron accepts all of your program. Now move PAGE to a higher value with a direct command such as:

```
PAGE = &5C00
```

Having done this, we're now ready to try to recover the bad program. CHAIN Program II and see if it works. If not, check the listing carefully and try again – not forgetting to reset PAGE.

Assuming all goes well, you

Address	Contents	Characters	
E00	D	13	Start
E01	0	0	Line High
E02	A	10	Line Low
E03	F	15	Length
E04	F4	244	Token
E05	20	32	
E06	50	80	P
E07	52	82	R
E08	4F	79	O
E09	47	71	G

Figure II: Program memory after PAGE

should have restored your program. It's now up to you.

Carefully go through the listing looking for the £ sign or other mistakes, correcting all you find before trying to run the recovered program.

You'll find that for any program of reasonable size the above recovery method takes several minutes to complete.

There is a way to speed this to less than a second and it also has the advantage that no Basic memory area is used, which means that you don't have to reset PAGE. This panacea is machine code.

When you run Program III it will produce a machine code program that does the same task as Program II. This machine code routine is designed to be stored below PAGE at addresses &D01 onwards – Plus 1 owners beware!

To use Program III type it in, save a copy then run it to assemble the machine code we're going to use to replace Program II.

When Program III has finished it has generated a machine code recovery program which is now lurking below PAGE. A copy of this assembled program is saved by entering:

```
*SAVE "RECOVER" D01 D90
```

When you've got this machine code safe on cassette, just load the bad program as before, and enter:

```
CALL &D01
```

which activates the recovery program.

To reload the machine code program at any time, type:

```
*LOAD "RECOVER"
```

This does not affect any Basic program already in the Electron. This means that when you get the dreaded message you can just:

```
*LOAD "RECOVER"
```

which puts the machine code recovery program into the Electron without harming your Basic program. Then enter:

```
CALL &D01
```

to set it to work and your program will be recovered.

```
  10 REM PROGRAM II
  20 REM RECOVERY (BASIC)
  30 thisline%=&E00:lastli
ne%=&E00
  40 end%=FALSE
  50 REPEAT
  60 PRINT~thisline%
  70 ?thisline%=&D
  80 IF ?(thisline%+1)>&7F
 THEN end%=TRUE
  90 PROCline
 100 IF thisline%>&E00 THE
N PROCnumber
 110 lastline%=thisline%
 120 thisline%=thisline%+b
yte%
 130 UNTIL end%=TRUE
 140 PAGE=&E00
 150 PRINT"Done"
 160 END
 170 :
 180 DEFPROCline
 190 byte%=4:endline%=FALS
E
 200 REPEAT
 210 IF ?(thisline%+byte%)
=&D THEN endline%=TRUE:GOTO
240
 220 IF ?(thisline%+byte%)
<&20 THEN ?(thisline%+byte%
)=&23
 230 byte%=byte%+1
 240 UNTIL endline%=TRUE O
R byte%=&FF
 250 ?(thisline%+3)=byte%
 260 ENDPROC
 270 :
 280 DEFPROCnumber
 290 IF ?(thisline%+1)>?(l
astline%+1) ENDPROC
 300 IF ?(thisline%+1)<?(l
astline%+1) THEN ?(thisline
%+1)=?(lastline%+1)
 310 IF ?(thisline%+2)>?(l
astline%+2) ENDPROC
 320 ?(thisline%+2)=?(last
line%+2)+1
 330 IF ?(thisline%+2)=0 T
HEN ?(thisline%+1)=?(thisli
ne%+1)+1
 340 ENDPROC
```

Program II

```
  10 REM PROGRAM III
  20 REM TO PRODUCE RECOVE
R (M/C)
  30 thisline%=&70:lastlin
e%=&72
  40 FOR I%=0 TO 3 STEP3
  50 P%=&D01
  60 [OPT I%
  70 LDA #0
  80 STA thisline%
  90 STA lastline%
 100 LDA &18
 110 STA thisline%+1
 120 STA lastline%+1
 130 LDY #0
 140 LDA #&D
 150 STA (thisline%),Y
 160 LDX #0
 170 .start
 180 LDY #1
 190 LDA (thisline%),Y
 200 BEQ next
 210 BMI end
 220 BPL number
 230 .next
 240 INY
 250 LDA (thisline%),Y
 260 BNE number
 270 .end
 280 LDY #1
 290 LDA #&FF
 300 STA (thisline%),Y
 310 RTS
 320 .line
 330 LDX #1
 340 LDY #4
 350 .loop
 360 LDA (thisline%),Y
 370 CMP #&D
 380 BEQ newline
 390 CMP #&20
 400 BCS continue
 410 LDA #&23
 420 STA (thisline%),Y
 430 .continue
 440 INY
 450 BNE loop
 460 LDA #&D
 470 LDY #&FF
 480 STA (thisline%),Y
 490 .newline
 500 TYA
 510 LDY #3
 520 STA (thisline%),Y
 530 LDA thisline%+1
 540 STA lastline%+1
 550 LDA thisline%
 560 STA lastline%
 570 CLC
 580 ADC (thisline%),Y
 590 STA thisline%
 600 BCC start
 610 INC thisline%+1
 620 BCS start
 630 .number
 640 TXA
 650 BEQ line
 660 LDY #1
 670 LDA (thisline%),Y
 680 CMP (lastline%),Y
 690 BEQ nextnumber
 700 BCS line
 710 LDA (lastline%),Y
 720 STA (thisline%),Y
 730 .nextnumber
 740 INY
 750 LDA (thisline%),Y
 760 CMP (lastline%),Y
 770 BEQ add
 780 BCS line
 790 .add
 800 LDA (lastline%),Y
 810 CLC
 820 ADC #1
 830 STA (thisline%),Y
 840 BNE line
 850 DEY
 860 LDA (thisline%),Y
 870 CLC
 880 ADC #1
 890 STA (thisline%),Y
 900 BPL line
 910 BMI end
 920 ]
 930 NEXT
```

Program III

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REMEMBER way back in August when we gave you the chance to win a Sign-point print port by becoming a cartoonist?

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Choosing the winners was a difficult task, but now print ports are on their way to Richard Fereday, of Palmers Green, London and Michael Lythgoe of Widnes, Cheshire.

September's competition had you all trying to sort out the mischief gremlins had caused to our programs.

Thanks for all your help – First Byte printer interfaces are on their way to Roy Preston of Midlothian and Gary Hugo of Lincoln.

CHRISTMAS is coming and *Electron User* is playing Santa Claus, courtesy of Epic Software.

We've got five sets of Epic's three classic adventures to give away in our free competition – Kingdom of Klein, Quest for the Holy Grail and Castle Frankenstein – all you need for hours of puzzles and pleasure.

And, since it's Christmas, it couldn't be easier to enter. All you have to do is to tell us why you like playing adventures.

The funniest, cleverest, most original or honest reason could make you one of the lucky five.

So, just finish the sentence on the form in not more than 20 words and send it in. The competition will close on Christmas Eve, December 24 and the judge's decision will be final.

Electron User contest entry form

Finish the following sentence in not more than 20 words:

I like playing adventures because . . .

_____

_____

_____

_____

_____

Name _____

Address _____

_____

_____

_____

Send to ADVENTURE, Electron User Contest, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

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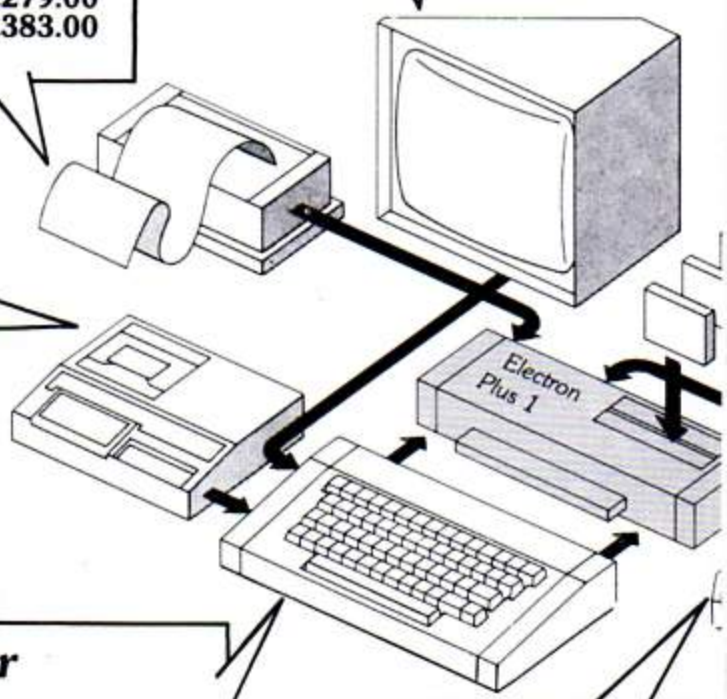

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Make light work of listings

To save your fingers most of the listings in *Electron User* have been put on tape.

On the December tape:

CHRISTMAS BOX Align the presents logically. **SILLY SANTA** Sort out the muddle. **SNAP** Match the Xmas pictures. **RECOVERY** The Bad Program message tamed. **CAROL** Interrupt driven music. **AUTODATA** A program that grows and grows. **NOTEBOOK** Simple string handling.

On the November tape:

STAR FIGHTER Anti-alien missions. **SCROLLER** Wrap around machine code. **URBAN SPRAWL** Environmental action game. **SPELL** Alphabetic education. **JUMPER** Level headed action. **CAESAR** Code breaking broken. **KEYBOARD** Typing game.

On the October tape:

BREAKFREE Classic arcade action. **ALPHASWAP** A logic game to strain your brain. **SOUND GENERATOR** Tame the Electron's sound channels. **MULTICHARACTER GENERATOR** Complex characters made simple. **RIGEL 5** Out of this world graphics. **MAYDAY** Help with your morse code. **NOTEBOOK** Palindromes and string handling.

On the September tape:

HAUNTED HOUSE Arcade action in the spirit world. **SPLASH** A logic game for non-swimmers. **SORT SHOWS** How sorting algorithms work. **SORT TIME** The time they take. **CLASSROOM INVADERS** Multicoloured characters go to school. **SAILOR** Nautical antics. **MATHS TEST** Try out your mental powers.

On the August tape:

SANDCASTLE The Electron seaside outing. **KNOCKOUT** Bouncing balls batter brick walls. **PARACHUTE** Keep the skydivers dry. **LETTERS** Large letters for your screen. **SUPER-SPELL** Test your spelling. **ON YOUR BIKE** Pedal power comes to your Electron. **SCROLLER** Sliced strings slide sideways. **FLYING PIGS** Bacon on the wing.

On the July tape:

GOLF A day on the links with your Electron. **SOLITAIRE** The classic solo logic game. **TALL LETTERS** Large characters made simple. **BANK ACCOUNT** Keep track of your money. **CHARTIST** 3D graphs. **FORMULAE** Areas, volumes and angles.

On the June tape:

MONEY MAZE Avoid the ghosts to get the cash. **CODE BREAKER** A mastermind is needed to crack the code. **ALIEN** See little green men – the Electron way! **SETUP** Colour commands without tears. **CRYSTALS** Beautiful graphics. **LASER SHOOT OUT** An intergalactic shooting gallery. **SMILER** Have a nice day!

On the May tape:

RALLY DRIVER High speed car control. **SPACE PODS** More aliens to annihilate. **CODER** Secret messages made simple. **FRUIT MACHINE** Spin the wheels to win. **CHASER** Avoid your opponent to survive. **TIC-TAC-TOE** Electron noughts and crosses. **ELECTRON DRAUGHTSMAN** Create and save Electron masterpieces.

On the April tape:

SPACEHIKE A hopping arcade classic. **FRIEZE** Electron wallpaper. **PELICAN** Cross roads safely. **CHESSTIMER** Clock your moves. **ASTEROID** Space is a minefield. **LIMERICK** Automatic rhymes. **ROMAN** Numbers in the ancient way. **BUNNYBLITZ** The Easter program. **DOGDUCK** The classic logic game.

On the March tape:

CHICKEN Let dangerous drivers test your nerve. **COFFEE** A tantalising word game from Down Under. **PARKY'S PERIL** Parky's lost in an invisible maze. **REACTION TIMER** How fast are you ? **BRAINTEASER** A puzzling program. **COUNTER** Mental arithmetic can be fun! **PAPER, SCISSORS, STONE** Out-guess your Electron. **CHARACTER GENERATOR** Create shapes with this utility.

On the February tape:

NUMBER BALANCE Test your powers of mental arithmetic. **CALCULATOR** Make your Electron a calculator. **DOILIES** Multi-coloured patterns galore. **TOWERS OF HANOI** The age old puzzle. **LUNAR LANDER** Test your skill as an astronaut. **POSITRON INVADERS** A version of the old arcade favourite.

On the introductory tape:

ANAGRAM Sort out the jumbled letters. **DOODLE** Multicoloured graphics. **EUROMAP** Test your geography. **KALEIDOSCOPE** Electron graphics run riot. **CAPITALS** New upper case letters. **ROCKET, WHEEL, CANDLE** Three fireworks programs. **BOMBER** Drop the bombs before you crash. **DUCK** Simple animation. **METEORS** Collisions in space.

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A delightful festive frolic from ROG FROST

HELP TO SORT OUT SANTA

SANTA has a bug in his operating system this year. He has delivered sacks of presents to the six people in Disc Drive, but put them in the wrong houses.

You, the Electron Elf, must sort out the muddle before everyone wakes up on Christmas morning.

You do this by moving from house to house collecting or dropping sacks. You can carry up to three sacks at a time.

If you succeed, then you get another go, but the time you are allowed is the time you took in your first go.

If you fail, you are given 20 seconds longer for your next turn. Appropriate tunes are played for success or failure and a record is kept of the fastest time.

The first part of the program uses a series of PROCcircles to produce a picture. The game itself follows and instructions are included within the program.

PROCEDURES

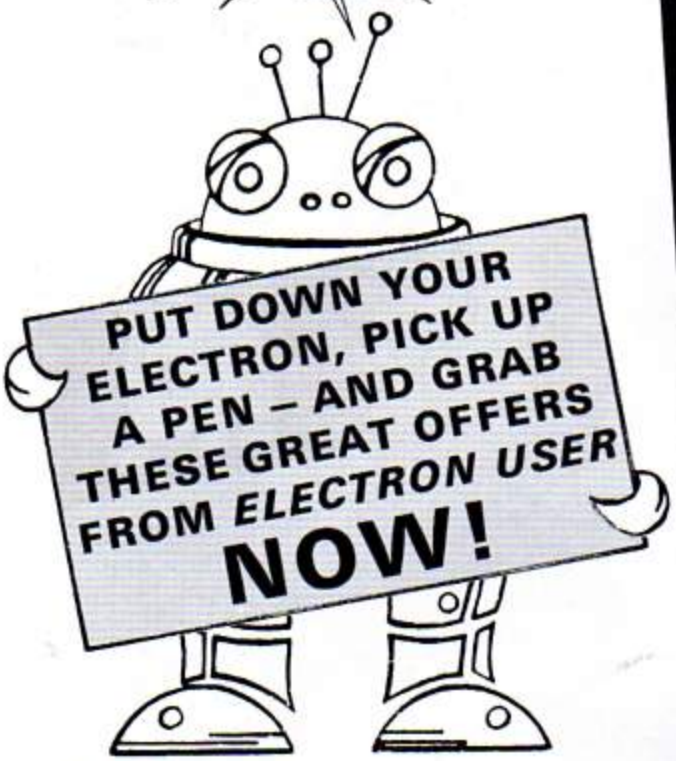
PROCcredits	Prints title.
PROCcircle (X,Y,R,C)	Used for starting picture. Draws circle centred at (X,Y), radius R in colour C.
PROCinstruct	Prints instruction on screen.
PROCchose	Decides which sack is randomly left at which house.
PROCsetup	Sets up text and graphics windows, selects colours, defines characters and some variables.
PROChouse (X,Y)	Draws houses at (X,Y).
PROCsanta (X,Y,C)	Draws a man in each house at position (X,Y) and logical colour C.
PROCsack	Positions sacks in the correct places.
PROCdecide	The playing part of the game in which you make decisions.
PROCremove	Deals with the removal of sacks from the houses.
PROCdrop	Deals with leaving sacks at houses.
PROCfail	Displays fail message.
PROCsuccess	Displays success message.
PROCgoodtune	Plays a happy Christmas song.
PROCbadtune	Plays a bad Christmas song.
PROChall	Prints the fastest time.

VARIABLES

T%	Time allowed to complete task.	**C$**	Shuffled B$
M%	Best time so far.	**carry$**	Sacks being carried at present.
z%	Number of present house.	**take$**	Sack you hope to take.
newz%	Number of house you hope to visit.	**leave$**	Sack you hope to drop.
A$(N)	Initial sack numbers	**drop$**	Sack you have dropped.
B$	Numbers 123456		

Full listing starts on Page 58

electron user



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MOUSER!

MOUSER was written to help children practice their skills with compass directions.

A mouse is hidden on a 12 x 12 grid labelled with the coordinates A1-L12. Your task is to send your cat to find the mouse but you only have five goes.

Each time you make a mistake the micro will tell you a compass direction to take.

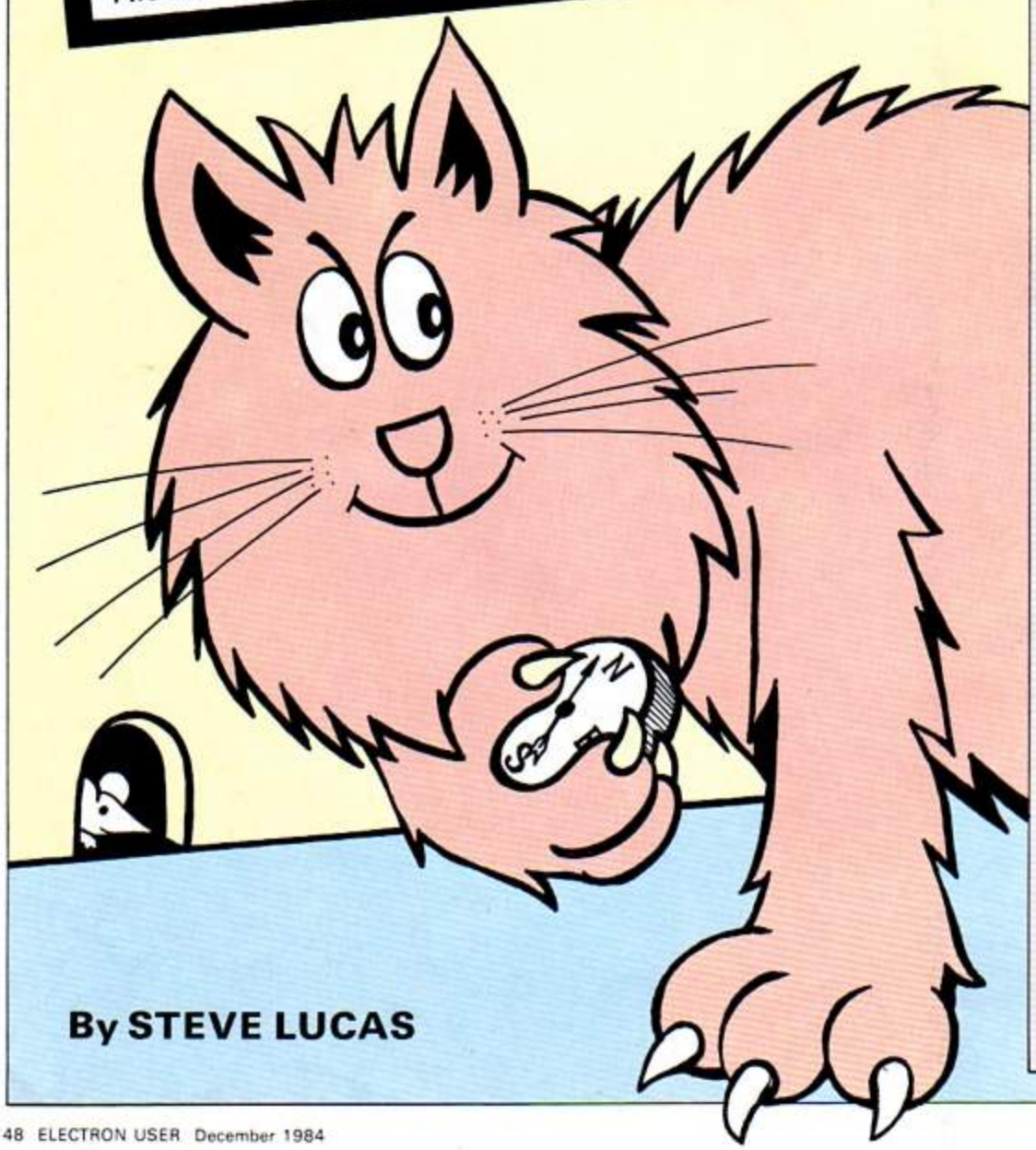
You must tell the micro the coordinate of the square you want to search. Incorrect coordinates will not be accepted.

I would recommend you change line 100 to *FX229,1 to disable Esc when you are sure that the program has been fully debugged.

If you want to make the game easier by having more turns, just change the value of S% in lines 80, 1200 and 1660 to give more than five goes.

PROCEDURES

PROCinstructions	Gives instructions.
PROCplace	Hide the mouse.
PROCguess	Guess location.
PROClose	Lose game.
PROCmouse	Draws mouse.
PROCcat	Draws cat.
PROCman	Draws man.
PROCmove	Chooses direction you can move.
PROCwin	Find mouse.
PROCsouth	Go South.
PROCnorth	Go North.



By STEVE LUCAS

```
   10 ON ERROR GOTO 1330
   20 REM ** Mouser **
   30 REM ** an educational
 game for the BBC and Elect
ron computers **
   40 REM ** Steve W. Lucas
 **
   50 REM ** (C) ELECTRON U
SER
   60 MODE1
   70 *KEY10 OLD:M RUN:M
   80 S%=5
   90 VDU23,1,0;0;0;0;
  100 REM ** change this li
ne to *FX229,1 when you hav
e fully debugged the progra
m to disable escape key **
  110 *FX210,0
  120REM ** define characte
rs **
  130VDU23,239,255,255,255,
255,255,255,255,255
  140VDU23,240,192,128,156,
191,255,255,65,113
  150VDU23,241,0,96,112,88,
204,252,0,192
  160VDU23,242,48,32,32,32,
32,32,31,15
  170VDU23,243,1,3,7,7,3,1,
255,255
  180VDU23,244,0,128,192,24
0,176,240,248,136
  190VDU23,245,7,3,1,1,0,1,
1,0
  200VDU23,246,255,255,253,
129,128,129,193,0
  210VDU23,247,134,128,128,
128,128,128,192,0
  220 VDU23,248,7,4,13,12,4
,6,1,1
  230VDU23,249,240,16,88,15
2,16,48,192,192
  240VDU23,250,0,3,6,12,9,9
,9,9
  250VDU23,251,128,224,176,
216,72,72,72,72
  260VDU23,252,29,21,21,3,3
,3,6,4
  270VDU23,253,92,212,212,2
24,224,224,48,16
  280VDU23,254,4,6,4,28,28,
0,0,0
  290VDU23,255,16,48,16,28,
28,0,0,0
  300 VDU19,0,3,0,0,0,19,1,
6,0,0,0,19,2,1,0,0,0,19,3,4
,0,0,0
  310 REM define envelopes
  320 ENVELOPE 1,1,1,0,0,20
```

```
0,0,0,126,0,0,-126,126,126
  330 ENVELOPE 2,1,-7,7,0,1
0,10,0,126,0,0,-126,126,126

  340 ENVELOPE 3,1,36,-36,0
,20,20,0,126,0,0,-126,126,1
26
  350 PROCinstructions
  360 T%=4
  370 GCOL0,1:FOR Y%=0 TO 8
00 STEP 150
  380 FOR X%=0 TO 800 STEP
150
  390 MOVEX%,75+Y%:MOVEX%,Y
%:PLOT85,X%+75,75+Y%:PLOT85
,X%+75,Y%:MOVEX%+75,Y%+75:M
OVEX%+75,Y%+150:PLOT85,X%+1
50,Y%+75:PLOT85,X%+150,Y%+1
50:NEXTX%,Y%
  400 GCOL0,2:MOVE0,0:DRAW9
00,0:DRAW900,900:DRAW0,900:
DRAW0,0
  410 VDU5:GCOL0,2:FORX%=1T
012:MOVE650,75+X%-30:PRINTX
%:NEXT:FORX%=1TO12:MOVE75+X
%-50,940:PRINTCHR$(64+X%):N
EXT:VDU4
  420 MOVE0,970:DRAW970,970
:DRAW970,0
  430 MOVE1100,600:DRAW1100
,700:PLOT85,1116,600:PLOT85
,1116,700:MOVE1108,730:MOVE
1085,700:PLOT85,1134,700
  440 VDU5:MOVE1100,760:PRI
NT"N":VDU4
  450 PRINTTAB(8)"M O U S E
 R"
  460 VDU28,31,31,39,20
  470 REM ** main game **
  480 PROCplace
  490 REPEAT
  500 PROCguess
  510 S%=S%-1
  520 T%=S%-1
  530 UNTIL S%=0
  540 PROClose
  550 END
  560 DEFPROCplace
  570 A%=RND(12):B%=RND(12)
  580 ENDPROC
  590END
  600 DEFPROCmouse(X%,Y%,Z%
)
  610 VDU5:MOVEX%,Y%:GCOL0,
Z%:VDU240,241,4:ENDPROC
  620 DEFPROCcat(X%,Y%,Z%)
  630 VDU5:MOVEX%,Y%:GCOL0,
Z%:VDU242,243,244,10,8,8,8,
245,246,247,4:ENDPROC
  640 DEFPROCman(X%,Y%,Z%)
  650 VDU5:MOVEX%,Y%:GCOL0,
Z%:VDU248,249,10,8,8,250,25
1,10,8,8,252,253,10,8,8,254
,255,4:ENDPROC
  660 DEFPROCmove
  670 PROCcat(C%*75-75,D%*7
5-5,2)
  680 SOUND 1,2,160,10
  690 ENDPROC
  700 DEFPROCguess
  710 CLS
  720 VDU 23,1,0;0;0;0;
  730 COLOUR 3
  740 PRINT"Enter    guess
   now :-"
  750 REPEAT
  760 A$=GET$:PRINTTAB(2,4)
;A$
  770 C%=ASC(A$)
  780 UNTIL C%>64 AND C%<77
  790 C%=C%-64
  800 REPEAT
  810 PRINTTAB(3,4)SPC6
  820 INPUT TAB(3,4)""A$
  830 D%=VAL(A$):IFD%>13 OR
D%<1 THEN VDU7
  840 UNTIL D%>0 AND D%<13
  850 VDU5:GCOL0,0: MOVE 99
0,920 :PRINT STRING$(9,CHR$
(239)):VDU4
  860 PROCmove
  870 b$=""
  880 IF A%=C% AND D%=B% TH
EN PROCwin
  890 IF D%<B% THEN PROCnor
th ELSE PROCsouth
  900 VDU5:MOVE990,1000:PRI
NT"you must"
  910 MOVE 990,960 :PRINT"g
o :-"
  920 MOVE 990,920 :PRINTb$
  930 MOVE 973,520 :GCOL0,0
:PRINTSTRING$(8,CHR$239);:G
COL0,2
  940 MOVE 970,550 :PRINT"t
urns"
  950 MOVE 970,520 :PRINT"l
eft :-";
  960 MOVE 900,520:PRINT T%
  970 VDU4
  980 ENDPROC
  990 DEFPROCnorth
 1000 b$="North"
 1010 IF C%<A% THEN b$=b$+"
east" ELSE IF C%>A% THEN b$
=b$+"west"
 1020 ENDPROC
 1030 DEFPROCsouth
 1040 IF B%<D% THEN b$="Sou
th"
 1050 IF A%>C% THEN b$=b$+"
east" ELSE IF C%>A% THEN b$
=b$+"west"
 1060 ENDPROC
 1070 DEFPROCwin
 1080 CLG
 1090 RESTORE
 1100 FORX=1TO6
 1110 READa%,b%,c%
 1120 PROCman(a%,b%,c%)
 1130 NEXT
 1140 SOUND 1,2,255,50
 1150 DATA 1000,1000,2,1000
,150,2,150,1000,2,150,150,2
,400,700,3,800,400,3
 1160 COLOUR3
 1170 VDU5
 1180 MOVE500,650:PRINT"W e
l l   D o n e"
 1190 MOVE 150,350:PRINT"Yo
u found the mouse"
 1200 S%=5
 1210 GCOL0,2
 1220 MOVE300,100:PRINT"Ano
ther game (Y/N) ?"
 1230 VDU4
 1240 VDU23,1,0;0;0;0;
 1250 REPEAT
 1260 yes$=GET$
 1270 UNTIL INSTR("YNyn",ye
s$)
 1280 IF yes$="Y" OR yes$="
y" THEN CLG:GOTO 360
 1290 CLG
 1300 VDU5:MOVE 200,600:PRI
NT"G o o d b y e.":VDU4
 1310 END
 1320 ENDPROC
 1330 MODE 6
 1340 PRINTTAB(5,15)"Error
 ";ERR;" in line number ";ER
L
 1350 END
 1360 DEFPROCinstructions
 1370 CLS
 1380 PRINTTAB(15,2)"M O U
S E R"
 1390 COLOUR 2
 1400 PRINT'''SPC(10);"(C)
 S.M. Lucas 1984"
 1410 COLOUR3
 1420 PRINT'''"This is a ga
me in which you must try to
 find the mouse which is hi
dden on the   board."
 1430 COLOUR2
 1440 PRINT'''"You must use
 your cat to search for the
 mouse by telling me the co
ordinate of   the square yo
u want to search."
 1450 COLOUR 3
 1460 PRINT''"I will then t
ell you which direction to
go in . You will have only
FIVE turns to find the mous
e in !"
 1470 REM ** you can alter
the number of turns by alte
ring the value of S% at the
 start of program
 1480 COLOUR 2
 1490 PRINT''"Do you want s
ound (Y)es or (N)o ?"
 1500 REPEAT
 1510 A$=GET$
 1520 UNTIL A$="Y" OR A$="N
"
 1530 IF A$="N" THEN *FX210
,1
 1540 PRINT''''"Press (Space
 Bar) to start the game"
 1550 REPEAT UNTIL GET=32
 1560 CLS:ENDPROC
 1570 DEFPROClose
 1580 CLS:PRINT"You"''"didn'
t"''"find it!"
 1590 A$="ABCDEFGHIJKL"
 1600 B$=MID$(A$,A%,1)
 1610 COLOUR 2
 1620 PRINT"It was"''"in ";B
$;B%
 1630 PROCmouse(A%*75-60,B%
*75-25,3)
 1640 SOUND 1,3,160,50
 1650 COLOUR 3
 1660 S%=5:T%=4
 1670 PRINT''"Another"''"Game
"''"(Y/N)?"
 1680 VDU23,1,0;0;0;0;
 1690 REPEAT
 1700 yes$=GET$
 1710 UNTIL INSTR("YNyn",ye
s$)
 1720 IF yes$="Y" OR yes$="
y" THEN CLG: GOTO 360
 1730 CLG
 1740 VDU5:MOVE 200,600:PRI
NT"G o o d b y e.":VDU4
 1750 END
```

This listing is included in this month's cassette tape offer. See order form on Page 47.

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We interrupt this program to bring you...

Xmas Carol

By ROLAND WADDILOVE

THE Editor stopped me. "Waddilove", he slurred. "Christmas is coming. Do something".

After spending a week or so racking my brains trying to think of an original Christmas program I came up with Xmas Carol. It simply wishes everyone a Merry Christmas to the accompaniment of a few festive tunes.

You may be wondering where the originality is in that. Well, it's not what it does, it's how it does it.

The program demonstrates the use of interrupts by playing carols while text is printed in different directions and with various degrees of rotation.

One of the most advanced features of the Electron, and the BBC Micro as well, is the extensive use of interrupts to control many of the background operating system tasks.

An interrupt is a signal sent to the microprocessor telling it to stop what it is doing and switch its attention to something else.

When it has finished this task it returns to whatever it was doing and carries on as if nothing had happened.

These background tasks include updating the clock, used by the pseudo variable TIME, processing envelopes, and maintaining the many input and output buffers and queues.

Interrupts give the impression that the Electron is capable of doing more than one thing at a time by repeatedly

→

VARIABLES

I%, J%	Used as loop counters.
a$, b$	Messages to be printed.
theta	Angle of letter in radians.
angle	Angle of letter in radians.
x%, y%	Position of letter.
X%, Y%	Position of letter.
size	Size of letter.
sin, cos	Work out SIN and COS function to save time.
letter$	Letter to be printed.
pointer	Pointer to next note.
sound	Parameter block for Osword call.

PROCEDURES

PROCstore_data	Disable start of screen synchronisation display event. Switch off ADC channels. Read and store data for tunes. Define function keys.
PROCassemble	Assemble machine code routine to play carols. Set event vector to point to code. Enable event.
PROCletters	Print the message.
PROCprint	Print a character at a given angle and position.

From Page 51

switching rapidly between tasks.

Interrupts must not have any effect on the interrupted program. If any of the processor's registers or flags are altered by the interrupt routine, then it will get in a terrible muddle when it returns, probably with disastrous consequences.

Acorn have thoughtfully provided the user with an easy to use, pre-packaged interrupt facility. Every 10 milliseconds an interrupt is generated by one of the timers inside the ULA to transfer program control to routines to deal with the background work.

In the process of carrying out this background work a number of events may be generated, such as the interval timer crossing zero. An event handling routine can be written by the user to which control is passed, when the appropriate event has been detected by the operating system.

The operating system detects all events but ignores them if they have not been enabled with a *FX14 command. If an event has been enabled then program execution indirects via the event vector at &220. (See Page 242 of the User Guide.)

The machine code routine in Xmas Carol is called 50 times a second, coincident with the start of vertical synchronisation of the screen display, by setting the event vector to point to the start of the code, and enabling it with *FX14,4.

When the code is called the registers and flags are saved. As only one event has been enabled there is no need to check that it is the right one.

First it is necessary to see if there is enough space in the sound buffer for the next note, otherwise the program would grind to a halt when it was full.

If there is not enough room the registers are restored and the routine ends.

If there is enough room, then the next note and its length is read from the data stored at page &A and placed in the parameter block at &71. Osword is called to insert the note into the sound buffer.

A check is made to see if the pointer is at the last note. If it is then it is reset to the start again. The registers are restored and the routine ends.

All this happens while the Electron is busy drawing the message on the screen, giving the appearance of doing two things at once.

The print routine works by printing the letter at the bottom left hand corner of the screen, and looking at the dot pattern produced.

You can't see it as it is printed in colour 3 which is set to black, the same as the background.

By using some elementary trigonometry the dot pattern can be rotated and drawn at any position on the screen. A point I%, J% when rotated through an angle theta becomes:

I%*COS (theta)–J%*SIN (theta), I%*SIN(theta)+ J%*COS (theta).

An allowance has to be made for the odd shaped pixels in Mode 5 but it is fairly straightforward.

To print text round in a circle you just move to a point on the circumference x%, y% which is radius*SIN (theta), radius*COS (theta). To make the text stand outwards the angle of rotation is –theta.

The machine code is placed at &900 and the data for the carols at &A00, which are buffers used by the cassette system.

It is safe to type in and run programs while the carols are playing, but loading or saving a program may corrupt the code so it is best to disable the routine with *FX13,4.

Don't just use the program as it is. Try experimenting with different tunes. (Lines 220, 230 and 790 must be set to the number of items in the data statement, 254 maximum.)

Alter the messages printed and see what happens if the size of the letters is changed.

Will it run in Mode 1? Try it and see. Alter it if necessary.

Xmas Carol listing

```
  10REM **XMAS PROGRAM**
  20REM *For Electron/Micr
o User*
  30REM *By R.A.Waddilove*
  40REM *Happy Christmas*
  50ON ERROR GOTO 1320
  60PROCstore_data
  70PROCassemble
  80MODE 5
  90PROCletters
 100TIME=0:REPEAT UNTIL TI
ME>500
 110PRINT TAB(5,31);"Press
 Space";
 120*FX21,0
 130REPEAT UNTIL GET=32
 140MODE 6
 150PRINT''"Function Keys
:-"''"f1 - LIST current pro
gram."''"f2 - delete curren
t program."''"f3 - end the
carols."
 160PRINT''"Programs can b
e typed in and run while t
he carols continue to play.
 To LOAD or SAVE a program
press f3."
 170END
 180
 190DEF PROCstore_data
 200*FX13,4
 210*FX16,0
 220?&70=244
 230FORIX=244 TO 1 STEP-1
 240READ JX:I%?&A00=JX
 250NEXT
 260*KEY1 "LIST07!M!NLIST!
M"
 270*KEY2 "NEW!M"
 280*KEY3 "*FX13,4!M"
 290*KEY10 "?&220=0:?&221=
9:*FX14,4!M"
 300ENDPROC
 310
 320REM pitch,length,...
```

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MULTI-FORTH 83 FOR THE ACORN ELECTRON

Xmas Carol listing

From Page 52


```
  330
  340REM **Silent Night**
  350DATA 80,15, 88,5, 80,1
0, 68,30, 80,15, 88,5, 80,1
0, 68,30, 108,30, 96,30, 10
0,30, 80,30, 88,30, 100,15,
 96,5, 88,10, 80,15, 88,5,8
0,10, 68,30
  360
  370REM **We Three Kings**
  380DATA 96,18, 88,9, 80,1
8, 68,9, 76,9, 80,9, 76,9,
68,27, 96,18, 88,9, 80,18,
68,9, 76,9, 80,9, 76,9, 68,
27, 80,18, 0,0, 80,9, 88,18
, 0,0, 88,9, 96,18, 0,0, 96
,9, 108,9, 100,9, 96,9, 88,
9, 96,9, 88,9, 80,18, 76,9,
68,40
  390
  400REM **Jingle Bells**
  410DATA 96,5, 0,0, 96,5,
0,0, 96,10, 0,0, 96,5, 0,0,
 96,5, 0,0, 96,10, 0,0, 96,
5, 108,5, 80,7, 88,3, 96,20
, 100,5, 0,0, 100,5, 0,0, 1
00,7, 0,0, 100,5, 96,5, 0,0
, 96,5, 0,0, 96,3, 0,0, 96,
3, 108,5, 0,0, 108,5, 100,5
, 88,5, 80,40
  420
  430REM **Away In A Manger
**
  440DATA 52,10, 72,10, 0,0
, 72,10, 80,5, 88,5, 72,10,
 0,0, 72,10, 88,5, 92,5, 10
0,10, 0,0, 100,10, 108,10,
92,20, 80,5, 88,5, 92,10, 0
,0, 92,10, 100,10, 88,10, 0
,0,  88,10, 72,5, 88,5, 80,
10, 60,10, 68,10,72,40
  450
  460DEF PROCassemble
  470pointer=&70
  480sound=&71
  490!sound=1
  500sound!2=-15
  510osword=&FFF1
  520osbyte=&FFF4
  530?&220=&00:?&221=&09
  540FOR pass=0 TO 2 STEP 2
  550P%=&900
  560[ OPT pass
  570PHP:PHA      \save regi
sters
  580TXA:PHA
  590TYA:PHA
  600LDA #&80
  610LDX #&FA
  620LDY #&FF
  630JSR osbyte  \space in
sound buffer?
  640CPX #10
  650BMI end     \if not en
ough
  660LDY pointer
  670LDA &A00,Y  \get pitch
  680STA sound+4
  690DEY
  700LDA &A00,Y  \get lengt
h
  710STA sound+6
  720LDA #7
  730LDX #sound MOD256
  740LDY #sound DIV256
  750JSR osword  \play note
  760DEC pointer
  770DEC pointer
  780BNE end
  790LDA #244:STA pointer
  800.end
  810PLA:TAY      \restore r
egisters
  820PLA:TAX
  830PLA:PLP
  840RTS
  850]
  860NEXT
  870*FX14,4
  880ENDPROC
  890
  900DEF PROCletters
  910VDU 23,1,0;0;0;0;
  920VDU 19,3,0;0;
  930GCOL 0,2
  940a$="Merry"
  950FOR I%=1 TO 5
  960PROCprint(MID$(a$,I%,1
),2,PI/2,128,I%*64+330)
  970NEXT
  980a$="Christmas"
  990b$="Everybody"
 1000FOR I%=1 TO 9
 1010PROCprint(MID$(a$,I%,1
),2,0,I%*128-80,900)
 1020PROCprint(MID$(b$,I%,1
),2,-PI/2,1144,900-I%*64)
 1030NEXT
 1040GCOL 0,1
 1050a$="ELECTRON USER"
 1060b$="MICRO  USER  "
 1070FOR I%=1 TO 13
 1080theta=RAD(I%*(360/14)-
(90+360/14))
 1090x%=639+200*SIN(theta)
 1100y%=452+200*COS(theta)
 1110PROCprint(MID$(a$,I%,1
),2,-theta,x%,y%)
 1120x%=639+110*SIN(theta)
 1130y%=452+110*COS(theta)
 1140PROCprint(MID$(b$,I%,1
),1,-theta,x%,y%)
 1150NEXT
 1160VDU 19,3,4;0;
 1170PRINT TAB(8,7);"From"
 1180ENDPROC
 1190
 1200DEF PROCprint(letter$,
size,angle,X%,Y%)
 1210LOCAL I%,J%
 1220PRINT TAB(0,31);letter
$;
 1230cos=size*COS(angle)
 1240sin=2*size*SIN(angle)
 1250FOR I%=0 TO 64 STEP 4
 1260FOR J%=0 TO 32
 1270IF POINT(I%,J%) PLOT 6
9,X%+I%*cos-J%*sin,Y%+(I%*s
in/4)+J%*cos
 1280NEXT
 1290NEXT
 1300ENDPROC
 1310
 1320REM ** error **
 1330MODE 6:VDU 19,0,4;0;14
 1340REPORT:PRINT" at line
";ERL
```

This listing is included in this month's cassette tape offer. See order form on Page 47.

From Page 16

```
   10 REM ***CHRISTMAS**SNA
P***
   20 REM ***BY P.TAYLER***
   22 REM**ELECTRON USER***
   23 REM**CHRISTMAS 1984**
   25PROCinstructions
   30 MODE2
   32 REPEAT
   35 VDU23,1,0;0;0;0;
   40 count=FALSE
   50 COLOUR135:CLS
   60 PROCproper_jack
   70REPEAT:PROCrandomcolou
r:PROCjack_in_the_box(11,30
):PROCcheck:UNTIL count=TRU
E
   90 count=FALSE
  100 PROCproper_tree
  110REPEAT:PROCrandomcolou
r:PROCchristmas_tree(11,30)
:PROCcheck:UNTIL count=TRUE
  130 count=FALSE
  140 PROCproper_santa
  150 REPEAT:PROCrandomcolo
ur:PROCsanta(11,30):PROCche
ck:UNTIL count=TRUE
  170 UNTIL FALSE
  180 DEFPROCjack_in_the_bo
x(X%,Y%)
  190 VDU28,X%,Y%,X%+7,Y%-2
9;17,135:CLS
  200 COLOURA:PRINTSPC(8);
  210COLOURA:PRINTSPC(1);:C
OLOURB:PRINTSPC(7);
  220COLOURA:PRINTSPC(1);:C
OLOURB:PRINTSPC(2);:COLOURC
:PRINTSPC(3);:COLOURB:PRINT
SPC(2);
  230COLOURA:PRINTSPC(1);:C
OLOURB:PRINTSPC(1);:COLOURC
:PRINTSPC(1);:COLOURD:PRINT
SPC(1);:COLOURC:PRINTSPC(1)
;:COLOURD:PRINTSPC(1);:COLO
URC:PRINTSPC(1);:COLOURB:PR
INTSPC(1);
  240COLOURA:PRINTSPC(1);:C
OLOURB:PRINTSPC(1);:COLOURC
:PRINTSPC(1);:COLOURD:PRINT
SPC(1);:COLOURC:PRINTSPC(1)
;:COLOURD:PRINTSPC(1);:COLO
URC:PRINTSPC(1);:COLOURB:PR
INTSPC(1);
  250 COLOURA:PRINTSPC(2);:
COLOURB:PRINTSPC(1);:COLOUR
C:PRINTSPC(1);:COLOURB:PRIN
TSPC(1);:COLOURC:PRINTSPC(1
);:COLOURB:PRINTSPC(1);:COL
OURA:PRINTSPC(1);
  260 COLOURA:PRINTSPC(2);:
COLOURB:PRINTSPC(1);:COLOUR
C:PRINTSPC(1);:COLOURB:PRIN
TSPC(1);:COLOURC:PRINTSPC(1
);:COLOURB:PRINTSPC(1);:COL
OURA:PRINTSPC(1);:COLOURA:P
RINTSPC(3);:COLOURB:PRINTSP
C(1);:COLOURC:PRINTSPC(1);:
COLOURB:PRINTSPC(1);
  270 COLOURA:PRINTSPC(2);:
COLOURA:PRINTSPC(3);:COLOUR
B:PRINTSPC(1);:COLOURC:PRIN
TSPC(1);:COLOURB:PRINTSPC(1
);:COLOURA:PRINTSPC(2);
  280 COLOURA:PRINTSPC(4);:
COLOURE:PRINTSPC(1);:COLOUR
A:PRINTSPC(3);:COLOURA:PRIN
TSPC(4);:COLOURE:PRINTSPC(1
);:COLOURA:PRINTSPC(3);:COL
OURA:PRINTSPC(5);:COLOURE:P
RINTSPC(1);:COLOURA:PRINTSP
C(2);:COLOURA:PRINTSPC(6);:
COLOURE:PRINTSPC(1);
  290 COLOURA:PRINTSPC(1);:
COLOURA:PRINTSPC(6);:COLOUR
E:PRINTSPC(1);:COLOURA:PRIN
TSPC(1);:COLOURA:PRINTSPC(5
);:COLOURE:PRINTSPC(1);:COL
OURA:PRINTSPC(2);
```

→

PROCEDURES

PROCinstructions	Sets up the introductory and instruction screens in Mode 6.
PROCrandomcolour	Gives values to the variables *B-H* (used in PROC's to set up the pictures). It decides a random value for *B*, and the others take their values from that.
PROCproper_jack **PROCproper_santa** **PROCproper_tree**	These set up a text window on the left of the screen, then the variables *A-H* are given their correct values, then it jumps into the corresponding general PROC (for example, PROCchristmas_tree).
PROCchristmas_tree **PROCjack_in_the_box** **PROCsanta**	These accept the randomly generated values for the variables *B-H*, set up a text window on the right of the screen, and then draw the corresponding picture.
PROCtune **PROCgoodwenceslas** **PROCjinglebells** **PROCdeckthehalls**	PROCtune uses a random feature to decide which of the four carols is to be played. It then calls up the appropriate PROC.

VARIABLES

count	Used to determine the point at which we jump out of the REPEAT . . . UNTIL loop. Initially count is FALSE, but if a correct match is made, it becomes TRUE.
X% and Y%	Used in PROCchristmas_tree and so on to set up the text window.
B to H	
random%	Used for the random colouring of the right-hand pictures. Actually, they are not truly random, as a variable *random%* becomes *B*, and then the other variables take their values in order from this one.
timeallowed	The variable set during the initialisation to decide how long should be allowed to the child to respond.
G	Also used as a keyboard variable using G=GET.
note	Used as a counter in the loops playing the carols. A, P and D (as appropriate) are used to read amplitude, pitch and duration.

From Page 55

```
  300 COLOURA:PRINTSPC(4);:
COLOURE:PRINTSPC(1);:COLOUR
A:PRINTSPC(3);:COLOURA:PRIN
TSPC(3);:COLOURE:PRINTSPC(1
);:COLOURA:PRINTSPC(4);:COL
OURA:PRINTSPC(2);:COLOURE:P
RINTSPC(1);:COLOURA:PRINTSP
C(5);:COLOURA:PRINTSPC(3);:
COLOURE:PRINTSPC(1);
  310 COLOURA:PRINTSPC(4);:
COLOURA:PRINTSPC(4);:COLOUR
E:PRINTSPC(1);:COLOURA:PRIN
TSPC(3);:COLOURA:PRINTSPC(4
);:COLOURE:PRINTSPC(1);:COL
OURA:PRINTSPC(3);
  320COLOURD:PRINTSPC(8);:C
OLOURD:PRINTSPC(1);:COLOURB
:PRINTSPC(2);:COLOURF:PRINT
SPC(3);:COLOURB:PRINTSPC(1)
;:COLOURD:PRINTSPC(1);
  330COLOURD:PRINTSPC(1);:C
OLOURC:PRINTSPC(3);:COLOURF
:PRINTSPC(1);:COLOURC:PRINT
SPC(2);:COLOURD:PRINTSPC(1)
;:COLOURD:PRINTSPC(1);:COLO
URB:PRINTSPC(3);:COLOURF:PR
INTSPC(1);:COLOURB:PRINTSPC
(2);:COLOURD:PRINTSPC(1);
  340COLOURD:PRINTSPC(1);:C
OLOURC:PRINTSPC(3);:COLOURF
:PRINTSPC(1);:COLOURC:PRINT
SPC(2);:COLOURD:PRINTSPC(1)
;
  350COLOURD:PRINTSPC(1);:C
OLOURB:PRINTSPC(2);:COLOURF
:PRINTSPC(2);:COLOURB:PRINT
SPC(2);:COLOURD:PRINTSPC(1)
;:COLOURD:PRINTSPC(1);:COLO
URC:PRINTSPC(6);:COLOURD:PR
INTSPC(1);:PRINT"Jack in ";
  355PRINT"the Box ";
  360 ENDPROC
  370 DEFPROCcheck
  375 *FX21,0
  380 G=INKEY(100*Z%):IF G=
32 THEN GOTO 400
  390 ENDPROC
  400 IF B=129 AND C=130 TH
EN count=TRUE:PROCtune
  405 VDU7
  409 *FX21,0
  410 ENDPROC
  420DEFPROCproper_jack
  430 A=135:B=129:C=130:D=1
31:E=132:F=133:G=134:VDU28,
1,30,8,1:COLOUR135:CLS:GOTO
200
  440 ENDPROC
  450 DEFPROCrandomcolour
  460 random%=RND(7)+128
  470 A=135:B=random%:IF B>
134 THEN B=B-7
  480 C=B+1:IF C>134 THEN C
=C-7
  490 D=B+2:IF D>134 THEN D
=D-7
  500 E=B+3:IF E>134 THEN E
=E-7
  510 F=B+4:IF F>134 THEN F
=F-7
  520 G=B+5:IF G>134 THEN G
=G-7
  530 H=B+6:IF H>134 THEN H
=H-7
  540 ENDPROC
  550 DEFPROCproper_santa
  560 A=135:B=129:C=130:D=1
31:E=132:F=133:G=134:H=128:
VDU 28,1,30,8,1:COLOUR134:C
LS:GOTO 590
  570 DEFPROCsanta(X%,Y%)
  580 VDU28,X%,Y%,X%+7,Y%-2
9:COLOUR135:CLS
  590 COLOURG:PRINTSPC(3);:
COLOURA:PRINTSPC(2);:COLOUR
G:PRINTSPC(3);:COLOURG:PRIN
TSPC(2);:COLOURA:PRINTSPC(4
);:COLOURG:PRINTSPC(2);:COL
OURG:PRINTSPC(1);:COLOURA:P
RINTSPC(1);:COLOURB:PRINTSP
C(4);:COLOURA:PRINTSPC(1);:
COLOURG:PRINTSPC(1);
  600 COLOURG:PRINTSPC(1);:
COLOURA:PRINTSPC(1);:COLOUR
E:PRINTSPC(1);:COLOURB:PRIN
TSPC(2);:COLOURE:PRINTSPC(1
);:COLOURA:PRINTSPC(1);:COL
OURG:PRINTSPC(1);
  610 COLOURG:PRINTSPC(1);:
COLOURA:PRINTSPC(1);:COLOUR
B:PRINTSPC(1);:COLOURH:PRIN
TSPC(2);:COLOURB:PRINTSPC(1
);:COLOURA:PRINTSPC(1);:COL
OURG:PRINTSPC(1);
  620 COLOURG:PRINTSPC(1);:
COLOURA:PRINTSPC(1);:COLOUR
B:PRINTSPC(4);:COLOURA:PRIN
TSPC(1);:COLOURG:PRINTSPC(1
);:COLOURG:PRINTSPC(2);:COL
OURA:PRINTSPC(4);:COLOURG:P
RINTSPC(2);
  630 COLOURG:PRINTSPC(3);:
COLOURA:PRINTSPC(2);:COLOUR
G:PRINTSPC(3);:COLOURG:PRIN
TSPC(2);:COLOURB:PRINTSPC(1
);:COLOURA:PRINTSPC(2);:COL
OURB:PRINTSPC(2);:COLOURG:P
RINTSPC(1);
  640 COLOURG:PRINTSPC(1);:
COLOURB:PRINTSPC(2);:COLOUR
A:PRINTSPC(2);:COLOURB:PRIN
TSPC(2);:COLOURG:PRINTSPC(1
);:COLOURB:PRINTSPC(3);:COL
OURA:PRINTSPC(2);:COLOURB:P
RINTSPC(3);
  650 COLOURB:PRINTSPC(3);:
COLOURA:PRINTSPC(2);:COLOUR
B:PRINTSPC(1);:COLOURG:PRIN
TSPC(1);:COLOURB:PRINTSPC(1
);
  660 COLOURB:PRINTSPC(1);:
COLOURG:PRINTSPC(1);:COLOUR
B:PRINTSPC(1);:COLOURA:PRIN
TSPC(2);:COLOURB:PRINTSPC(1
);:COLOURG:PRINTSPC(1);:COL
OURA:PRINTSPC(1);
  670 COLOURB:PRINTSPC(1);:
COLOURG:PRINTSPC(1);:COLOUR
H:PRINTSPC(4);:COLOURG:PRIN
TSPC(1);:COLOURB:PRINTSPC(1
);
  680 COLOURB:PRINTSPC(1);:
COLOURG:PRINTSPC(1);:COLOUR
H:PRINTSPC(4);:COLOURG:PRIN
TSPC(1);:COLOURB:PRINTSPC(1
);
  690 COLOURA:PRINTSPC(1);:
COLOURG:PRINTSPC(1);:COLOUR
H:PRINTSPC(4);:COLOURG:PRIN
TSPC(1);:COLOURA:PRINTSPC(1
);:COLOURG:PRINTSPC(2);:COL
OURB:PRINTSPC(4);:COLOURG:P
RINTSPC(2);
  700 COLOURG:PRINTSPC(2);:
COLOURB:PRINTSPC(4);:COLOUR
G:PRINTSPC(2);:COLOURG:PRIN
TSPC(2);:COLOURB:PRINTSPC(4
);:COLOURG:PRINTSPC(2);:COL
OURG:PRINTSPC(2);:COLOURB:P
RINTSPC(1);:COLOURG:PRINTSP
C(2);:COLOURB:PRINTSPC(1);:
COLOURG:PRINTSPC(2);
  710 COLOURG:PRINTSPC(2);:
COLOURB:PRINTSPC(1);:COLOUR
G:PRINTSPC(2);:COLOURB:PRIN
TSPC(1);:COLOURG:PRINTSPC(2
);
  720 COLOURG:PRINTSPC(2);:
COLOURB:PRINTSPC(1);:COLOUR
G:PRINTSPC(2);:COLOURB:PRIN
TSPC(1);:COLOURG:PRINTSPC(2
);
  730 COLOURG:PRINTSPC(2);:
COLOURB:PRINTSPC(1);:COLOUR
G:PRINTSPC(2);:COLOURB:PRIN
TSPC(1);:COLOURG:PRINTSPC(2
);:COLOURG:PRINTSPC(2);:COL
OURB:PRINTSPC(1);:COLOURG:P
RINTSPC(2);:COLOURB:PRINTSP
C(1);:COLOURG:PRINTSPC(2);
  740 COLOURG:PRINTSPC(2);:
COLOURH:PRINTSPC(1);:COLOUR
G:PRINTSPC(2);:COLOURH:PRIN
TSPC(1);:COLOURG:PRINTSPC(2
);:COLOURG:PRINTSPC(2);:COL
OURH:PRINTSPC(1);:COLOURG:P
RINTSPC(2);:COLOURH:PRINTSP
C(1);:COLOURG:PRINTSPC(2);
  750 COLOURG:PRINTSPC(2);:
COLOURH:PRINTSPC(1);:COLOUR
G:PRINTSPC(2);:COLOURH:PRIN
TSPC(1);:COLOURG:PRINTSPC(2
);
  760 COLOURG:PRINTSPC(2);:
COLOURH:PRINTSPC(1);:COLOUR
G:PRINTSPC(2);:COLOURH:PRIN
TSPC(1);:COLOURG:PRINTSPC(2
);:COLOUR G:PRINTSPC(1);:CO
LOURH:PRINTSPC(2);:COLOURG:
PRINTSPC(1);:COLOURH:PRINTS
PC(2);:COLOURG:PRINTSPC(2);
  765 COLOURG:PRINTSPC(8);
  767 PRINT" Santa ";
  770 ENDPROC
  780 DEFPROCproper_tree
  790 A=135:B=129:C=130:D=1
31:E=132:F=133:G=134:H=129:
VDU28,1,30,8,1:COLOUR135:CL
S:GOTO 820
  800 DEFPROCchristmas_tree
(X%,Y%)
  810 VDU28,X%,Y%,X%+7,Y%-2
9:COLOUR135:CLS
  820COLOURA:PRINTSPC(8);:C
OLOURA:PRINTSPC(4);:COLOURD
:PRINTSPC(1);:COLOURA:PRINT
SPC(3);:COLOURA:PRINTSPC(3)
;:COLOURD:PRINTSPC(3);:COLO
URA:PRINTSPC(2);
  830COLOURA:PRINTSPC(4);:C
OLOURD:PRINTSPC(1);:COLOURA
:PRINTSPC(3);:COLOURA:PRINT
SPC(4);:COLOURC:PRINTSPC(1)
;:COLOURA:PRINTSPC(3);
  840COLOURA:PRINTSPC(3);:C
OLOURB:PRINTSPC(1);:COLOURC
:PRINTSPC(1);:COLOURB:PRINT
SPC(1);:COLOURA:PRINTSPC(2)
;
  850COLOURA:PRINTSPC(3);:C
```

```
OLOURC:PRINTSPC(1);:COLOURB
:PRINTSPC(1);:COLOURC:PRINT
SPC(1);:COLOURA:PRINTSPC(2)
;:COLOURA:PRINTSPC(2);:COLO
URB:PRINTSPC(1);:COLOURC:PR
INTSPC(3);:COLOURB:PRINTSPC
(1);:COLOURA:PRINTSPC(1);
  860COLOURA:PRINTSPC(2);:C
OLOURC:PRINTSPC(2);:COLOURB
:PRINTSPC(1);:COLOURC:PRINT
SPC(2);:COLOURA:PRINTSPC(1)
;:COLOURA:PRINTSPC(1);:COLO
URB:PRINTSPC(1);:COLOURC:PR
INTSPC(5);:COLOURB:PRINTSPC
(1);
  870COLOURA:PRINTSPC(1);:C
OLOURC:PRINTSPC(3);:COLOURB
:PRINTSPC(1);:COLOURC:PRINT
SPC(3);:COLOURA:PRINTSPC(1)
;:COLOURC:PRINTSPC(7);:COLO
URA:PRINTSPC(1);:COLOURB:PR
INTSPC(1);:COLOURC:PRINTSPC
(5);:COLOURB:PRINTSPC(1);
  880COLOURA:PRINTSPC(4);:C
OLOURB:PRINTSPC(1);:COLOURA
:PRINTSPC(3);:COLOURA:PRINT
SPC(4);:COLOURC:PRINTSPC(1)
;:COLOURA:PRINTSPC(3);:COLO
URA:PRINTSPC(4);:COLOURC:PR
INTSPC(1);:COLOURA:PRINTSPC
(3);
  890COLOURA:PRINTSPC(1);:C
OLOURH:PRINTSPC(7);:COLOURA
:PRINTSPC(1);:COLOURH:PRINT
SPC(7);:COLOURA:PRINTSPC(2)
;:COLOURH:PRINTSPC(5);:COLO
URA:PRINTSPC(1);
  900COLOURA:PRINTSPC(3);:C
OLOURH:PRINTSPC(3);:COLOURA
:PRINTSPC(2);:COLOURA:PRINT
SPC(3);:COLOURH:PRINTSPC(3)
;:COLOURA:PRINTSPC(2);
  910COLOURA:PRINTSPC(1);:C
OLOURD:PRINTSPC(1);:COLOURE
:PRINTSPC(1);:COLOURD:PRINT
SPC(1);:COLOURA:PRINTSPC(1)
;:COLOURF:PRINTSPC(1);:COLO
URE:PRINTSPC(1);:COLOURF:PR
INTSPC(1);
  920COLOURA:PRINTSPC(1);:C
OLOURE:PRINTSPC(3);:COLOURA
:PRINTSPC(1);:COLOURE:PRINT
SPC(3);
  930COLOURA:PRINTSPC(1);:C
OLOURD:PRINTSPC(1);:COLOURE
:PRINTSPC(1);:COLOURD:PRINT
SPC(1);:COLOURA:PRINTSPC(1)
;:COLOURF:PRINTSPC(1);:COLO
URE:PRINTSPC(1);:COLOURF:PR
INTSPC(1);:PRINT''"The Tree
";
  940 ENDPROC
 1050 DEFPROCtune
 1060 tune=RND(100)
 1070 IF tune<25 PROCgoodwe
nceslas:ENDPROC
 1071 IF tune<50 PROCjingle
bells:ENDPROC
 1072 IF tune<75 PROCdeckth
ehalls:ENDPROC
 1073 IF tune>74 PROCsither
carol:ENDPROC
 1080 ENDPROC
 1090DEFPROCgoodwenceslas
 1099 RESTORE 1110
 1100 FOR note=1 TO 64 :REA
D A,P,D:SOUND1,A,P,D:SOUND1
,0,0,0:NEXT
 1110 DATA -15,60,8,0,60,1.
5,-15,60,8,0,60,1.5,-15,60,
8,-15,68,8,-15,60,8,0,60,1.
5,-15,60,8,-15,40,16,-15,48
,8,-15,40,8,-15,48,8,-15,56
,8,-15,60,16,0,60,1.5,-15,6
0,16,-15,60,8,0,60,1.5,-15,
60,8,0,60,1.5,-15,60,8,-15,
68,8,-15,60,8
 1120 DATA 0,60,1.5,-15,60,
8,-15,40,16,-15,48,8,-15,40
,8,-15,48,8,-15,56,8,-15,60
,16,0,60,1.5,-15,60,16,-15,
88,8,-15,80,8,-15,76,8,-15,
68,8,-15,76,8,-15,68,8,-15,
60,16,-15,48,8,-15,40,8,-15
,48,8,-15,56,8,-15,60,16,0,
60,1.5
 1130    DATA -15,60,16,-15
,40,8,0,40,1.5,-15,40,8,-15
,48,8,-15,56,8,-15,60,8,0,6
0,1.5,-15,60,8,-15,68,16,-1
5,88,8,-15,80,8,-15,76,8,-1
5,68,8,-15,60,16,-15,80,16,
-15,60,32
 1135 FOR delay=1TO1200:NEX
T
 1140 ENDPROC
 1150 DEFPROCjinglebells
 1160 RESTORE 1180
 1170 FOR note=1 TO 106:REA
D P,D:SOUND 1,-15,P,D:SOUND
 1,0,0,0:NEXT note
 1180   DATA 60,4,96,4,88,4
,80,4,60,8,12,4,60,2,60,2,6
0,4,96,4,88,4,80,4,68,8,20,
8,68,4,100,4,96,4,88,4,76,8
,28,8,108,4,108,4,100,4,88,
4,96,8,80,8,60,4,96,4,88,4,
80,4,60,8,12,8,60,4,96,4,88
,4,80,4,68,8,20,4,68,4,68,4
,100,4,96,4,88,4,100,4
 1190 DATA 108,4,108,4,108,
4,116,4,108,4,100,4,88,4,80
,12,32,4
 1200 DATA 96,4,96,4,96,8,9
6,4,96,4,96,8,96,4,108,4,80
,4,88,4,96,8,48,8,100,4,100
,4,100,6,100,2,100,4,96,4,9
6,4,96,2,96,2,96,4,88,4,88,
4,80,4,88,4,108,12,96,4,96,
4,96,8,96,4,96,4,96,8,96,4,
108,4,80,6,88,2,96,8,48,8,1
00,4,100,4,100,6,100,2
 1205 FOR delay=1TO1000:NEX
T
 1210 DATA 100,4,96,4,96,4,
96,2,96,2,108,4,108,4,100,4
,88,4,80,16
 1220 ENDPROC
 1230 DEFPROCdeckthehalls
 1240 RESTORE 1260
 1250 FOR note= 1 TO 69:REA
D P,D:SOUND 1,-15,P,D:SOUND
 1,0,0,0:NEXT note
 1260 DATA 52,12,44,4,40,8,
32,8,24,8,32,8,40,8,24,8,32
,4,40,4,44,4,32,4,40,12,32,
4,24,8,20,8,24,16,52,12,44,
4,40,8,32,8,24,8,32,8,40,8,
24,8,32,4,40,4,44,4,32,4,40
,12,32,4,24,8,20,8,24,16,32
,12,40,4,44,8,32,8,40,12,44
,4,52,8,32,8
 1270 DATA 40,4,44,4,52,8,6
0,4,68,4,72,4,60,4,52,8,48,
8,52,16,52,12,44,4,40,8,32,
8,24,8,32,8,40,8,24,8,32,4,
40,4,44,4,32,4,40,12,32,4,2
4,8,20,8,24,16
 1275 FOR delay=1TO1000:NEXT
 1280 ENDPROC
 1290 DEFPROCsithercarol
 1300 RESTORE 1320
 1310 FOR note=1 TO 58:READ
 P,D:SOUND 1,-15,P,D:SOUND
 1,0,0,0:NEXT note
 1320 DATA 24,4,32,4,24,8,4
0,4,44,4,40,8,52,4,60,4,52,
8,60,8,20,8,20,8,32,4,24,4,
20,4,12,4,4,8,24,4,32,4,24,
8,40,4,44,4,40,8,52,4,60,4,
52,8,60,8,20,8,20,8,24,24,6
0,4,68,4,72,8,68,4,60,4,60,
8,52,8,52,8,44,4,52,4,60,8,
52,4,44,4,44,8,40,8
 1330 DATA 40,8,32,4,40,4,3
2,8,40,4,32,4,24,8,40,8,52,
8,60,8,20,8,20,8,24,24
 1335 FOR delay=1TO1000:NEXT
 1340 ENDPROC
 9999 DEFPROCinstructions
10000 VDU19,0,3,0,0,0,19,1,
1,0,0,0
10005 CLS
10010 PRINT''SPC(5);"WELCOM
E TO CHRISTMAS SNAP"
10020 PRINT''SPC(5);"  WRIT
TEN BY PHIL TAYLER"
10030 PRINT''SPC(5);"  FOR
THE ELECTRON MICRO"
10040 PRINT''SPC(5);"  (WIL
L ALSO RUN ON BBC)"
10050 PRINT''SPC(5);"PRESS
SPACEBAR TO CONTINUE"
10060 REPEAT:G=GET:UNTIL G=
32
10070 VDU19,0,6,0,0,0,19,1,
4,0,0,0
10075 CLS
10080 PRINT''"      The chi
ld will see two pictures
 appear on the screen. These
 will change colour after a
 time interval you will bea
sked to enter later.      W
hen all the colours do not
match, no response should b
e made by the child."
10090 PRINT''"When the two
pictures  on the screen do
match, however, the SPACEBA
R should be pressed.  This
will register a response fr
om the micro, as indeed wil
l any false presses."
10100 PRINT''" Please enter
 the number of seconds you w
ish to give the child to re
act....."''" Minimum is 1/2
 a second"''" Maximum is 9 s
econds"
10110 PRINT''"Enter number o
f seconds as a number, or p
ress 0 for 1/2 second."
10120 REPEAT:G=GET:UNTIL G>
47 AND G<58
10130 IF G=48 THEN Z%=.5 EL
SE Z%=G-48
10140 ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 47.

From Page 45

```
  10REM SILLYSANTA
  20REM By Roq Frost
  30REM With help from Sue
Frost
  40REM (C) ELECTRON USER
1984
  50MODE2
  60VDU23;8202;0;0;0;
  70PROCcredits
  80GCOL0,134:CLG
  90GCOL0,2:MOVE0,0:MOVE12
79,0:PLOT85,0,400:PLOT85,12
79,400
 100PROCcircle(600,800,240
,7)
 110PROCcircle(600,360,360
,7)
 120PROCcircle(600,800,220
,1)
 130PROCcircle(600,360,350
,1)
 140PROCcircle(600,760,200
,7)
 150PROCcircle(600,800,200
,3)
 160PROCcircle(520,850,40,
4)
 170PROCcircle(680,850,40,
4)
 180PROCcircle(600,760,50,
1)
 190PROCcircle(600,800,70,
3)
 200PROCcircle(600,800,20,
1)
 210PROCcircle(600,100,10,
7)
 220PROCcircle(600,200,10,
7)
 230PROCcircle(600,300,10,
7)
 240PROCcircle(600,400,10,
7)
 250PROCcircle(600,500,10,
7)
 260PRINTTAB(4,20)"SILLY S
ANTA"
 270PRINTTAB(0,0)""
 280VDU19,6,4,0,0,0
 290GCOL0,3:MOVE1000,900:M
OVE1100,900:PLOT85,1050,800
 300MOVE1000,850:MOVE1100,
850:PLOT85,1050,950
 310PROCgoodtune:FORdelay%
=0TO5000:NEXT
 320T%=10000:M%=10000
 330MODE6
 340VDU19,0,4,0,0,0
 350PROCinstruct
 360MODE2
 370ONERROR CLEAR:GOTO330
 380VDU19,1,4,0,0,0
 390*FX11,0
 400VDU23,8202;0;0;0;
 410COLOUR1
 420PROCchose
 430PROCsetup
 440PROChouse(100,800):PRO
Chouse(500,800):PROChouse(9
00,800):PROChouse(100,400):
PROChouse(500,400):PROChous
e(900,400)
 450PROCsanta(200,900,2):P
ROCsanta(600,900,3):PROCsan
ta(1000,900,4):PROCsanta(20
0,500,5):PROCsanta(600,500,
6):PROCsanta(1000,500,0)
 460PROCsack
 470VDU4
 480PROCdecide
 490CLEAR
 500GOTO360
 510END
 520DEFPROChouse(xpos%,ypo
s%)
 530MOVE xpos%,ypos%
 540MOVE xpos%+200,ypos%
 550PLOT85,xpos%,ypos%+100
 560PLOT85,xpos%+200,ypos%
+100
 570MOVE xpos%+100,ypos%+1
80
 580PLOT85,xpos%,ypos%+100
 590MOVE xpos%+150,ypos%+1
00:MOVE xpos%+150,ypos%+180
:PLOT85,xpos%+180,ypos%+180
:MOVE xpos%+150,ypos%+100:P
LOT85,xpos%+180,ypos%+100
 600 MOVE0,0
 610ENDPROC
 620DEFPROCsanta(xpos%,ypo
s%,col%)
 630VDU5
 640GCOL 0,col%
 650MOVE xpos%,ypos%
 660PRINT;santa$
 670ENDPROC
 680DEFPROCsack
 690VDU19,14,3,0,0,0
 700VDU23,240,15,7,3,1,3,7
,15,31
 710VDU23,241,240,224,192,
128,192,224,240,248
 720VDU23,242,63,63,63,63,
31,31,15,7
 730VDU23,243,252,252,252,
252,248,248,240,224
 740sack$=CHR$240+CHR$241+
CHR$8+CHR$10+CHR$8+CHR$242+
CHR$243
 750GCOL0,14
 760MOVE 80,890:PRINT;sack
$:MOVE 480,890:PRINT;sack$:
MOVE 880,890:PRINT;sack$
 770MOVE 80,490:PRINT;sack
$:MOVE 480,490:PRINT;sack$:
MOVE 880,490:PRINT;sack$
 780GCOL4,1
 790MOVE 115,860:PRINT;A$(
1):MOVE 515,860:PRINT;A$(2)
:MOVE 915,860:PRINT;A$(3)
 800MOVE 115,460:PRINT;A$(
4):MOVE 515,460:PRINT;A$(5)
:MOVE 915,460:PRINT;A$(6)
 810GCOL0,7
 820MOVE 100,750:PRINT;H$;
I$:MOVE 500,750:PRINT;H$;J$
:MOVE 900,750:PRINT;H$;K$;M
OVE 100,380:PRINT;H$;L$:MOV
E 500,380:PRINT;H$;M$:MOVE
900,380:PRINT;H$;N$
 830MOVE300,850:DRAW500,85
0:MOVE700,850:DRAW900,850
 840MOVE300,450:DRAW500,45
0:MOVE700,450:DRAW900,450
 850MOVE600,800:DRAW200,55
0:MOVE600,800:DRAW1000,550
 860ENDPROC
 870DEFPROCdecide
 880COLOUR1
 890TIME=0
 900REPEAT
 910VDU19,col%,7,0,0,0
 920z%=newz%
 930col%=z%+1:IFcol%=7 THE
N col%=0
 940VDU19,col%,1,0,0,0
 950VDU28,0,24,19,22
 960PRINTTAB(0,1)"You are
at house ";z%
 970VDU28,0,31,19,25
 980VDU23;8202;0;0;0;
 990IF LEN(carry$)>2 THEN
GOTO 1080
1000IFA$(z%)="" THEN GOTO1
080
1010REPEAT
1020INPUTTAB(0,1)"What wil
l you take",take$
1030PRINTTAB(18,1)"  "
1040UNTIL take$="" OR take
$=A$(z%)
1050 IF take$=A$(z%) PROCr
emove
1060carry$=carry$+take$
1070CLS
1080 IF A$(z%)<>"" THEN GO
TO 1190
1090REPEAT
1100INPUTTAB(0,1)"What wil
l you drop",leave$
1110PRINTTAB(18,1)"  "
1120FOR loop=1 TO LEN carr
y$
1130 drop$=MID$(carry$,loo
p,1)
1140 IFdrop$=leave$ GOTO11
60
1150NEXT
1160UNTIL leave$="" OR lea
ve$=drop$
1170IFdrop$=leave$ PROCdro
p
1180CLS
1190REPEAT
1200INPUTTAB(0,1)"Where wi
ll you go",newz%
1210PRINTTAB(18,1)"  "
1220IF newz%=0 AND A$(1)="
1" AND A$(2)="2" AND A$(3)=
"3" AND A$(4)="4" AND A$(5)
="5" AND A$(6)="6" THEN GOT
O 1300
1230IF z%=1 UNTILnewz%=2
1240 IF z%=2 UNTIL newz%=1
 OR newz%=4 OR newz%=3 OR n
ewz%=6
1250IF z%=3 UNTIL newz%=2
1260IF z%=4 UNTIL newz%=5
OR newz%=2
1270IF z%=5 UNTIL newz%=4
OR newz%=6
1280IF z%=6 UNTIL newz%=2
OR newz%=5
1290CLS
1300UNTIL TIME>T% OR A$(1)
="1" AND A$(2)="2" AND A$(3
)="3" AND A$(4)="4" AND A$(
5)="5" AND A$(6)="6"
1310IF TIME>T% THEN PROCfa
il ELSE PROCsuccess
1320ENDPROC
1330DEFPROCsetup
1340VDU24,0;350;1279;1023;
1350VDU28,0,31,19,22
1360GCOL0,129:CLG:COLOUR13
```

```
5:CLS
 1370VDU23,230,24,126,255,1
26,126,60,24,24
 1380VDU23,231,255,189,189,
60,60,102,102,231
 1390VDU23,255,255,255,255,
255,255,255,255,255
 1400santa$=CHR$230+CHR$8+C
HR$10+CHR$231
 1410VDU19,2,7,0,0,0:VDU19,
3,7,0,0,0:VDU19,4,7,0,0,0:V
DU19,5,7,0,0,0:VDU19,6,7,0,
0,0:VDU19,0,7,0,0,0
 1420H$="no."
 1430I$="1":J$="2":K$="3":L
$="4":M$="5":N$="6"
 1440carry$=""
 1450new%=1
 1460ENDPROC
 1470DEFPROCremove
 1480VDU5
 1490GCOL0,7
 1500IF z%=1 THEN MOVE80,89
0:PRINT;sack$:A$(1)=""
 1510IF z%=2 THEN MOVE480,8
90:PRINT;sack$:A$(2)=""
 1520IF z%=3 THEN MOVE880,8
90:PRINT;sack$:A$(3)=""
 1530IF z%=4 THEN MOVE80,49
0:PRINT;sack$:A$(4)=""
 1540IF z%=5 THEN MOVE480,4
90:PRINT;sack$:A$(5)=""
 1550IF z%=6 THEN MOVE880,4
90:PRINT;sack$:A$(6)=""
 1560VDU4
 1570ENDPROC
 1580DEFPROCdrop
 1590X=INSTR(carry$,drop$)
 1600Y=LEN(carry$)
 1610carry$=LEFT$(carry$,X-
1)+MID$(carry$,X+1,Y)
 1620VDU5
 1630IF z%=1 THEN GCOL0,14:
MOVE 80,890:PRINT;sack$:GCO
L4,1:MOVE 115,860:PRINTleav
e$:A$(1)=leave$
 1640IF z%=2 THEN GCOL0,14:
MOVE 480,890:PRINT;sack$:GC
OL4,1:MOVE 515,860:PRINTlea
ve$:A$(2)=leave$
 1650IF z%=3 THEN GCOL0,14:
MOVE 880,890:PRINT;sack$:GC
OL4,1:MOVE 915,860:PRINTlea
ve$:A$(3)=leave$
 1660IF z%=4 THEN GCOL0,14:
MOVE 80,490:PRINT;sack$:GCO
L4,1:MOVE 115,460:PRINTleav
e$:A$(4)=leave$
 1670IF z%=5 THEN GCOL0,14:
MOVE 480,490:PRINT;sack$:GC
OL4,1:MOVE 515,460:PRINTlea
ve$:A$(5)=leave$
 1680IF z%=6 THEN GCOL0,14:
MOVE 880,490:PRINT;sack$:GC
OL4,1:MOVE 915,460:PRINTlea
ve$:A$(6)=leave$
 1690VDU4
 1700ENDPROC
 1710DEFPROCfail
 1720T%=TIME
 1730VDU26
 1740VDU23;8202;0;0;0;
 1750COLOUR128:CLS
 1760VDU20:VDU19,14,3,0,0,0
,19,1,4,0,0,0
 1770COLOUR2
 1780PRINT'''"You took too
long!!"
 1790PRINT'''"Granny will be
"''"suprised to get a"''"ra
ttle."
 1800PROCbadtune
 1810PROChall
 1820T%=T%+2000
 1830PRINTTAB(0,11)"Space b
ar for next"''"go."
 1840REPEAT UNTIL GET=32
 1850ENDPROC
 1860DEFPROCsuccess
 1870T%=TIME
 1880VDU20:VDU19,14,3,0,0,0
,19,1,4,0,0,0
 1890VDU4
 1900VDU28,0,31,19,22
 1910VDU23;8202;0;0;0;
 1920COLOUR129:CLS
 1930COLOUR3
 1940PRINT"A happy person
in"''"every house."
 1950PRINT'"You took ";T%DI
V100;" seconds"
 1960PROCgoodtune
 1970IF M%>T% THEN M%=T%
 1980PROChall
 1990PRINTTAB(0,11)"Space b
ar for next"''"go."
 2000REPEAT UNTIL GET=32
 2010ENDPROC
 2020DEFPROCinstruct
 2030PRINT'''"Santa has been
 very silly this year."''"H
e has left his presents at
the wrong"''"houses."
 2040PRINT'"You have only a
 limited time before all"''"
the people wake up and find
 his mistake."
 2050PRINT'"You can move fr
om house to house along"''"t
he white paths, collecting
presents"''"which can be see
n numbered in each"''"house
and leaving presents at the
"''"right house."
 2060PRINT'"Another problem
 is that your strength"''"is
 limited. You can only mana
ge to"''"hold three sets of
presents."
 2070PRINT'"Press the space
 bar to continue."
 2080REPEAT UNTIL GET=32
 2090CLS
 2100PRINT'''"If you do not
 want to take or leave"''"an
y presents just press RETUR
N."''"You must always press
RETURN after "''"you have en
tered any number."
 2110PRINT'''"When you have
completed your task"''"press
 0 to take you home."''"San
ta will then send you on a
new"''"mission but he will g
ive you less time."
 2120PRINT'''"Will you get
a happy person in every"''"h
ouse?"
 2130PRINT'''"Press the spa
ce bar to start the game."
 2140REPEAT UNTIL GET=32
 2150ENDPROC
 2160DEFPROCchose
 2170DIMA$(6)
 21808$="123456":C$="":C=6
 2190REPEAT
 2200R=RND(C)
 2210C$=C$+MID$(B$,R,1)
 2220B$=LEFT$(B$,R-1)+RIGHT
$(B$,LEN(B$)-R)
 2230C=C-1
 2240UNTILB$=""
 2250FOR N=1 TO 6
 2260A$(N)=MID$(C$,N,1)
 2270NEXTN
 2280ENDPROC
 2290DEFPROCgoodtune
 2300RESTORE2320
 2310FORtune%=1TO30:READpit
ch%,dur%:SOUND1,-15,pitch%+
50,dur%-2:SOUND1,0,52,1:NEXT
 2320DATA32,10,52,10,52,5,6
0,5,52,5,48,5,40,10,24,10,4
0,10,60,10,60,5,68,5,60,5,5
2,5,48,10,32,10
 2330DATA48,10,68,10,68,5,7
2,5,68,5,60,5,52,10,40,10,3
2,5,32,5,40,10,60,10,48,10,
52,20
 2340ENDPROC
 2350DEFPROCbadtune
 2360RESTORE2380
 2370FORnote%=1TO10:READpit
ch%,dur%:SOUND1,-15,pitch%,
dur%-2:SOUND1,0,52,1:NEXT
 2380DATA96,10,96,10,96,20,
96,10,96,10,96,20,96,10,107
,10,78,16,85,6
 2390SOUND1,-15,92,14
 2400 FOR PITCH=92 TO 40 ST
EP-1
 2410SOUND1,-15,PITCH,1
 2420 NEXT PITCH
 2430SOUND0,-15,7,20
 2440ENDPROC
 2450DEFPROCcredits
 2460PRINTTAB(2,5)"E L E C
T R O N"TAB(6,10)"U S E R"T
AB(2,15)"P R E S E N T S"
 2470FOR delay%=0TO10:VDU19
,7,RND(7),0,0,0:FORpause%=0
TO500:NEXT:NEXT:VDU20
 2480ENDPROC
 2490DEFPROCchall
 2500VDU26
 2510VDU23;8202;0;0;0;
 2520CLS
 2530PRINTTAB(0,5)"The best
 time is ";M%DIV100;" SEC
ONDS."
 2540ENDPROC
 2550DEFPROCcircle(X,Y,R,C)
 2560GCOL0,C
 257@LOCAL I,J
 2580FOR I=Y+R TO Y-R STEP-
4
 2590J=SQR(ABS(R*R-(I-Y)*(I
-Y)))
 2600MOVE X-J,I
 2610DRAWX+J,I
 2620NEXT
 2630MOVE0,0
 2640ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 47.

ADVERTISERS INDEX

Micro Messages

Moving down the line a little further

I READ with interest the letter in the October 1984 edition of the Electron User concerning moving the Electron screen down one line (p 62 "Moving down the line"). I would like to expand upon the ideas of Mr K. Sharkey in the following way.

I notice that a VDU 11 (Ctrl K) will in fact only move the screen down one line if the text cursor is positioned somewhere on the top line of the screen.

To overcome this I would suggest that a VDU 30 (Ctrl .) should be used immediately before the VDU 11. This has the effect of homing the text cursor to the top left hand corner of the screen, therefore ensuring that the following VDU 11 command has the desired effect.

Having carried out this operation you do however leave the text cursor at the top of the screen, which means that any subsequent text will be printed at that position.

To rectify this the following statement could be used:

A=POS:B=VPOS–1:
VDU30,11:P.TAB(A,B)

The variables POS and VPOS contain the X, Y coordinates of the text cursor's present screen position.

Having "remembered" your current screen position you can then use the VDU 30,11 command to move the screen display down one line. Having moved the image down the screen it is then possible, with the P.TAB(A,B) command, to return to your original position.

As you can see, you do in fact return to the same point on the X axis but one line up on the Y axis 'B=VPOS–1'.

This is to enable you to return to the "physical" point that you left, rather than the point in the text.

This is really only necessary if your original position was on the bottom line of the screen. To return to that position in the text you would need to move to a position off the bottom of the screen.

I would suggest that users incorporate these commands into a procedure and than call the procedure when they wish to display a complete picture on the screen.

I hope that this additional information will be of value to your readers. The credit goes to K. Sharkey whose initial idea was the catalyst to the above line of thought. – **Martin Grantham, Acorn Customer Services Dept.**

● As ever, Acorn Customer Services Department produces the goods. Any more hints for us, Martin?

Short cut

IF you own Mr Wiz from Superior Software and just can't get onto the next screen then try pressing Caps lock, Q,1, all at the same time. You should start at the beginning of the next screen. – **Richard R. Fairbrother, Stapleford, Notts.**

● Many thanks for the tip – but it sounds suspiciously like cheating.

Bug in solitaire

HAVING typed in and run your Solitaire program (in the July 1984 issue) I find there is a small bug.

If you wish to move a disc in coordinate position (3,1) up you are able to do so. Of course you would normally not wish to make this move, but if you do accidentally you will ruin the game.

There is an easy remedy – by inserting GCOL 0,0 in to line 200 and removing GCOL 0,0 from line 210.

This changes the X and Y labels to black so that the X label is not detected as a disc and so the move cannot be made. – **Robert D. Snelling, Haslingfield, Cambridge.**

● Well spotted Robert. And many thanks for the remedy. It's always nice to hear from people who've probed into the workings of the games as well as playing them.

View into the ROM

Here's a short program for those of you interested in finding out what lies in the output area of your ROM. You'll probably be amazed, I was.

Enter the Basic program, making sure that nothing occupies the output area (Plus 1 or other add-on) then run the program.

```
10 FOR N=&FC00 TO &FF00
20 IF ?N>31 AND ?N<127 T
HEN PRINT CHR$(?N);
30 NEXT
40 END
```

While I was playing around PEEKing into the ROM area I found some interesting words not listed in the manual, such as BOOT.

Also in the error message area I found "No Not Bad". Is this a compliment? – **E.T. (nothing to do with the film) Jones, Hillingdon, Middlesex.**

● Fascinating stuff Mr Jones. The BOOT command is for the disc filing system, but the error message is a mystery. We doubt that it's a compliment!

Station now closing down

REGARDING N. Wright's letter in Micro Messages about broadcasting Electrons, you said that you couldn't get yours to broadcast on your radio.

Well I have a very mysterious situation at my house. Both my sister and I got the same music centre for Christmas and my sister keeps on complaining about my Electron's sound effects on her radio in her room.

Yet mine is right next to my Electron and there's no interference at all. So we swopped machines – and it was still the same. Hers in her room suffered interference and mine in my room didn't. So this might mean distance from the Electron has something to do with it. – **Miles Touchard, Maidenhead, Berkshire.**

● We had a feeling of

→

WHAT would you like to see in future issues of Electron User?

What tips have you picked up that could help other readers?

Now's here is your opportunity to share your experiences.

Remember that these are the pages that you write yourselves. So tear yourself away from your Electron keyboard and drop us a line.

The address is:

Micro Messages
Electron User
Europa House
68 Chester Road
Hazel Grove
Stockport
SK7 5NY.

Micro Messages

From Page 61

foreboding when we said last month that this correspondence was closed. Since then we've had lots of letters pointing out the distance effect, so we are publishing this FINAL letter.

Olympic records

I'D like to make a complaint about Micro Olympics.

After receiving a copy, I was most angry at the way the player runs in the running events: the action of pressing down two keys as fast as possible was causing vibrations which were felt throughout the house.

On account of this, and the fact that my parents weren't going to pay for another keyboard, I was banned from playing this otherwise very good game.

Thus I wish I'd never had the luck to get a copy.

Meanwhile on a less serious note, here are my records on the day before I was banned:

100m	*9.07 secs*
200m	*18.93 secs*
400m	*42.41 secs*
800m	*1:47.68 secs*
1500m	*3:54.58 secs*
Javelin	*99.99m*
Discus	*71.11m*
Hammer	*84.79m*
Long jump	*8.98m*
High jump	*2.40m*
Pole vault	*5.60m*

– C.J. Underhill, Whitton, Twickenham.

● Don't your fingers get very sore?

– and more

I THINK I've set the standards for all you athletes out there with my records on Micro Olympics:

100m	*8.92 secs*
200m	*17.33 secs*
Long jump	*9.01m*
High jump	*2.39m*
Javelin	*100.93m*
Discus	*70.85m*

– A. Ennis, Herne Hill, London.

● Congratulations on your micro-athleticism! We have little doubt that others will be claiming better records.

Claim to fame

USING the command: ?&FE45 = 1, I have been able to slow down the BBC Micro. Is there any way of doing this on the Electron?

May I say that so far Electron User has been unfaultable. However, maybe I could suggest a couple more features which even The Micro User hasn't got.

□ A Hall of Fame, where readers could boast their high scores. Here are some of my own:

Cybertron	*41630*
Chuckie Egg	*365790*
Positron	*41960*
Snapper	*23465*
Croaker	*14260*
Cylon Attack	*31970*

Maybe a Micro Olympics table could be included.

□ An adventure solver page, where tips on how to solve popular adventures could be printed. I have solved two: Stranded, and Arrow of Death (pt. 1). Maybe Twin Kingdom Valley and Castle Frankenstein could be the first? – **David Thompson, Sale, Cheshire.**

● If there is a POKE to slow down the Electron, we don't know about it. What we want to know is why you want to slow it down in the first place!

The Hall of Fame idea is nice, but how do we know that the scores are genuine? As for Micro Olympics, your wish is our command.

Finally we're trying to persuade Merlin to do a regular column, but every time we call round on him we're told that he's gone out for a spell.

Oh Brother

I RECENTLY bought a Brother HR5 printer on the understanding that it was compatible with the Electron.

However I am having great trouble producing graphics, as everything seems to be for the Epsom printers.

I understand a screen dump routine is required, but cannot find one for Brother to Electron. Can you help? – **Ben Still, Bushey Heath, Herts.**

● We haven't come across a screen dump routine for the Brother HR5. Could any of our readers help?

Exploring the OS

AFTER having endured Basic and eventually got round to learning machine code I am now ready to risk exploring the operating system. Could you recommend a book? – **Ian Woodruff, Garstang, Lancs.**

● There are two books we can recommend. The first is the Basic ROM User Guide by Mark Plumbley, published by Adder. This explains in depth how the Electron's Basic works.

The second is Acornsoft's Electron User Guide, by Mark Holmes and Adrian Dickens. This covers both the software and hardware aspects of the Electron.

Trill to victory

IN answer to Chris Jones' enquiry (Electron User November 1984) concerning the Micro Olympics, I am a music teacher and as a pianist I find no difficulty in beating the contestants (and world records!).

I just play the "left foot – right foot" keys as if they were a trill on the piano. I think readers might well discover that most pianists will equally be world champions! – **David Forshaw, St. Helens, Lancs.**

● So playing the piano helps you excel at Micro Olympics, does it? Is the reverse true? Does Micro Olympics help you with your piano playing?

Diagonal scrolling demonstration

I'VE written a short program demonstrating a diagonal scrolling technique. The string variable A$ will take a message of any length but the space at the end is necessary.

– M.J. Rance, Broadstairs, Kent.

● Thanks for the first diagonal scroller we've received. Our original scrolling program seems to have struck a chord with *Electron User* readers and we've had all sorts of similar programs.

What a lot of little scrollers you are.

```
  10 REM DIAGONAL SCROLL
  20 REM MICHAEL RANCE
  30 MODE 6
  40 VDU 23,1,0;0;0;0;
  50 A$="***ELECTRON USER*
**DIAGONAL SCROLL BY M.J.RA
NCE "
  60 REPEAT
  70 PROCscroll
  80 UNTIL FALSE
  90 END
 100 DEF PROCscroll
 110 REM FILL FIRST DIAGONAL
 120 FOR X=1 TO 14
 130 Y=0
 140 REPEAT:Y=Y+1
 150 PRINT TAB(25-X+Y,19-X
+Y)MID$(A$,Y,1);
 160 UNTIL Y=X:NEXT
 170 REM SCROLL REST OF ME
SSAGE
 180 FOR a=2*LENA$ TO 1 ST
EP-1
 190 FOR Y=1 TO 15
 200 IF 2*LENA$-a+Y>LENA$
b=LENA$-a+Y ELSE b=2*LENA$-
a+Y
 210 PRINT TAB(10+Y,4+Y)MI
D$(A$,b,1);
 220 NEXT,:ENDPROC
```

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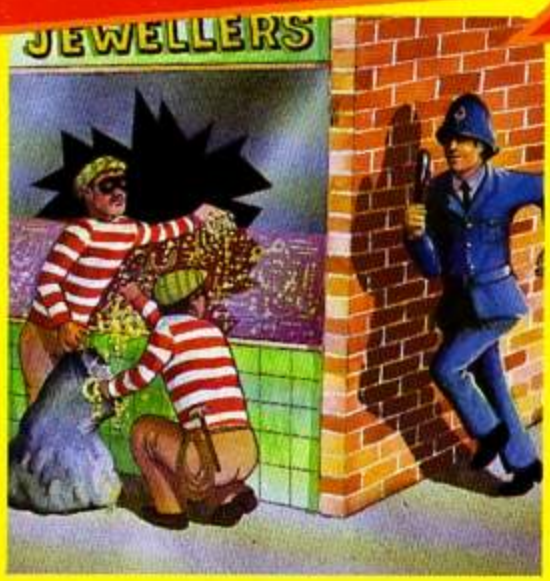

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